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The Massachusetts Medical Society

SECTION OF RADIOLOGY AND PHYSIOTHERAPY

Georgian Room, Hotel Statler, June 9, 1931, 9:00 A.M.

Dr. Arthur H. Ring, Presiding

CHAIRMAN RING: We shall have to have a nominating committee for the officers for next year. On that nominating committee I appoint Dr. O'Toole, Dr. Baxter and Dr. S. A. Robins. If the committee will please bring in a report before the end of the session we can carry out the necessary formality.

The first paper is, at the request of Dr. Fred Lund, an historical paper by Dr. William D. McFee, on "Physical Therapy in Retrospect."

PHYSICAL THERAPY IN RETROSPECT*

BY WILLIAM D. MC FEE, M.D.†

THE INTRODUCTION

THE American Medical Association gave its official recognition of physical therapy in 1925 when the American Council of Physical Therapy was founded. It is the duty of this council to examine the multitude of therapeutic devices and apparatus in order to formulate suitable standards for the treatment of disease by physical measures, and to initiate adequate teaching courses in physical therapy. At present, unqualified men employ electricity without proper medical training. If treatment by electricity is initiated without adequate medical supervision, many disastrous results will ensue. Its proper and successful use demands a knowledge of the physics and technique involved. Medical training is a highly specialized and very large section of medical practice, and before a man may acquire proficiency therein, he must govern himself in all branches requisite to success in general medicine, and must have intimate knowledge of the action of the various physical remedies upon living tissues. The name Physiotherapy was adopted when the United States Government gave its endorsement to the value of physical measures for the treatment of disease, and when thoroughly equipped departments for this work were established in the army and the navy hospitals. Later when offices for this treatment were established in various communities by those not having medical degrees, who called themselves Physiotherapists, the American Medical Association coined the name Physical Therapy, and established the group known as the Council of Physical Therapy. Therefore, at the present time, Physical Therapy is the generally accepted name designating the practice of physical measures for the treatment of disease. The chief reason why physical therapy has not been given more attention is partly lack of instruction in the medical schools and partly lack of interest in the medical societies. To effect this lack of education, the American Academy of Physical Therapy and the American Physical Therapy Association have adopted a fine curriculum for physicians and for the training of aides, and have designated hospital and training courses that are acceptable. For a quarter of a century, Vienna was the only university where instruction courses were given. Now Columbia, Johns Hopkins, Leland Stanford, Indiana and other large universities have adopted it—as well as the local schools, Harvard, Boston University and Tufts. The chief organizations, advocates of physical therapy, are the American Medical Association, the New England Association of Physical Therapeutics and the Massachusetts Medical Society.

THE HISTORY OF PHYSICAL THERAPY

Physical therapy may be defined as the employment of the physical forces of nature in medical and surgical practice. The main physical therapeutic agents are heat, water, light, massage, exercise and electricity. Physical therapeutic practice dates back to the first inhabitants of this earth when they licked their wounds and basked in the sun. In 3000 B.C. the Chinese employed rubbing as a therapeutic measure. Hippocrates in 460 B.C. wrote extolling the virtues of massage. In the Odyssey, we read of "women who rubbed and kneaded returned battle heroes". Homer sings of bathing. In India, China, Greece, Egypt and Turkey, massage was a daily routine following the bath. The Nile and Ganges were worshipped for their curative powers. Rome was noted for its famous baths.

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Thus up through the ages, we find traces of physical therapy. In the 16th century, therapeutic use was revised in Europe by Fabricius who applied it to stiff joints and similar conditions. During the Dark Ages, little or no progress was made. In 1742, Walter Harris treated certain diseases with irradiated foods. In 1812, Peter Henry Ling first placed massage on a scientific basis. The sun was suggested as a treatment of arthritis in 1840. Metzger of Amsterdam in 1853 encouraged massage and instituted the first intelligent and methodical use of it. Dr. Douglas Graham published the first American work on massage. In 1879 to the Dane, Niels Finsen, who had been hopelessly ill since youth, we are indebted for the knowledge of the value of the sun,—particularly the use of artificial sun in the treatment of disease. In 1891, Sir William Crookes studied and interpreted the phenomena of electrical discharge in high vacuum tubes. Nikola Tesla first suggested the medical use of that form of electricity now called high frequency. Four years later, Wilhelm Konrad Roentgen discovered x-ray. Herbert Jackson gave the world the plans on which are constructed all x-ray tubes of the present day. Galen, Priessnitz, Winternitz, Ritter, D'Arsonval, Curie, Baruch, Herschel and many others are milestones in the progress of physical therapy. To Winternitz, we owe the origin of hydrotherapy on a physiological basis. Herschel, by use of the thermometer, discovered the invisible infra-red zone. By treating a suppurative abdominal wound with sunlight, in 1902, Bernhard's noted clinic was founded.

Hand in hand with the development of massage went scientific muscle reëducation by training (either with or without mechanical assistance). There are seven principal movements in massage, and the advantages are: it promotes metabolism, maintains nutrition, restores strength to weak muscles, prevents adhesions and breaks them up if they have already formed, and hastens repair after injury. The three principal massage movements are *effleurage*, or stroking; *petrissage*, or kneading, grasping, compressing, pinching; *tapotement*, or striking, hacking, and slapping.

Hydrotherapy began with the first bath taken by man. It is the use of water in its three physical states; solid, liquid, gaseous. Hydrotherapy was introduced into the United States by Russell Thacher Trall and Joel Slew. It was taken up by Simon Baruch, who held a chair at Columbia University where he taught that "water has a place as stimulant, sedative, tonic, emetic, antiseptic, promoter of metabolism, etc." Dr. Baruch spoke before the Massachusetts Medical Society many times on the advantages of Hydrotherapy. It is particularly effective in hospitals for mental and nervous disorders, because of its soothing, assuaging effects.

In all ages, heat has been instinctively used for the amelioration of pain. Heat may be conductive, convective or conversive. Nagelschmidt of Berlin in 1907 demonstrated that high frequency currents produced a heating-through of the tissues and gave it the name diathermy. It is the most popular form of high frequency and the most valuable form of heat used in therapy. It is also called thermo-penetration and electro-penetration. Diathermy is the method of directing and localizing heat in body tissues by high frequency currents. A high frequency current is an electrical current having such a high rate of alternations or oscillations that living tissues do not attempt to contract under each impulse. It is not only beneficial—but painless.

Electrotherapy is a vital part of physical therapy. The father of electricity was Wilhelm Gilbert, a courtesan of Queen Elizabeth. In 1672, a German teacher discovered static electricity. Galvani in 1791 published a treatise and announced the facts which laid the foundation of that science which now bears his name. His nephew, Aldini, four years later lectured on the positive value and remedial powers of electricity in certain forms of paralysis, epilepsy, debility and impaired nerve energy. Fifty years after electricity had been used as a remedial agent, Faraday discovered the induction current. Duchenne wrote two outstanding books on the faradic current in 1850 and his disciples carried on his theories. Remak, a leader of the opposite school, introduced his book on galvanic streams in 1855. Mechano-electrical effects are produced by the interrupted galvanic, the faradic, the sinusoidal and static currents. They are useful for purposes of stimulation and are reconstructive in action.

The field of application of electricity in the healing art is a large one. Electricity is one of the greatest remedial agents. The *effects* produced by electricity may be divided into three major divisions:

Mechanical—This includes mechanotherapy, the static, the faradic, the interrupted galvanic and the sinusoidal currents.

Chemical—This includes the ultraviolet ray, the x-ray, and the galvanic current.

Thermal—This includes the high frequency electricity, the high wattage incandescent light and the infra-red.

The results brought about by means of different electrical currents and methods of technic are manifold: Namely, they cause powerful muscular contraction of voluntary and involuntary muscle fibers; stimulate the nerves and tune them to normal vibration producing sensory effects; relieve pain or over-irritation, and improve inflammatory conditions; dilate or constrict cutaneous blood vessels; increase or stop hemorrhage; increase or decrease blood pressure without producing heart depression; correct

faulty metabolism; harden or liquefy the tissues; and produce artificial respiration.

Too much cannot be said of the place the galvanic current has held during the past centuries. It is still invaluable, but the more common uses today are made of high frequency, sinusoidal currents and of the various measures of radiology. Much of value has been accomplished in the field of surgery by the employment of high frequency electricity and the x-ray, and particular attention should be given to the accomplishments from the use of high frequency currents known as electrodesiccation, electrocoagulation and electrodisintegration in the treatment of many forms of cancer and allied growths. A fact of great importance in the surgical use of high frequency currents, if properly employed, is that there is no postsurgical shock, and none or very little blood loss following or during the operation.

The static baths reduce nervous irritability. The static brush discharge causes fine vibrations in the deeper structures, aids restoration of the normal circulation and relieves local congestion. The static spark, first used in 1734 by Abbé Nollett as a therapeutic agent is painful, but very effective in extreme cases of neuritis. The static wave current is successfully used in the treatment of practically all forms of inflammation. The incandescent light is used as a curative measure. The relief of pain and increased functional activity, both in the skin and the deeper tissues, are brought about by this high incandescent light wattage.

The diseases treated and benefited by electrotherapy are too numerous to mention, but some of those in the treatment of which good results are obtained are sprains, bruises, lacerated wounds, chronic rheumatism, chorea, arthritis, neuralgia, neuritis, circulatory disorders, skin diseases, tuberculosis, various types of cancer and other accessible growths.

THE IMPETUS THE WAR GAVE TO PHYSICAL THERAPY

Physical therapy is one of the lessons of the great war. The war accomplished a great deal for the cause of physical therapy, by creating a department for which hitherto no groundwork had been laid, and by convincing many physicians of its value, who would never have been convinced under civil conditions. Since the World War, there has been a pronounced revival of interest in physical therapy in America. The United States Public Health Service and the Veterans' Bureaus have made considerable use of it during postwar years. The United States Government came to appreciate the value of physical measures of treatment, so that all government hospitals have physical therapy departments. Hydrotherapy plays a major rôle in the Veterans' hospitals, as does also mechanotherapy. The contrast bath strengthens the stumps, the continuous bath calms the excitable, shell-shock cases, the whirlpool bath is used for stiff joints. Dr. C. M. Sampson says, "The magnificent showing made by physiotherapy would have been in no way possible if it had not been for the wholehearted and unreserved coöperation of Surgeon-General Ireland, Colonel Billings and the late Dr. Frank Butler Granger of Boston." Dr. Granger was a Fellow of the Massachusetts Medical Society, whose 150th anniversary we are celebrating today. In the late war, no progress resulted until physical therapy was separated from the medical and surgical departments and was established as a distinct unit of such. Now the American Medical Association speaks of the Triad of Medicine, Surgery and Physical Therapy. The *Military Journal* for September, 1920, states the following results: "In 1919 at the United States Naval Hospital in New York, the plan was consummated for the efficient care of cases requiring the essentials of physical therapy. Special exercises were given to improve the condition and muscular tone of stumps thus making possible a much earlier use of the new leg. Much was done to abolish the use of crutches. Games to develop the power of balance and to aid the individual with amputations to get accustomed to new limbs, were devised. Light duties were urged, the duty being especially designed for the development of the particular part of the body needing exercise." Cases of nerve injury paralysis were sent to the clinics during the war for physical therapy treatments. Following the gassing of the service men, cases of asthma, bronchitis, pulmonary tuberculosis, etc., developed. These maladies were greatly benefited by electro-therapy treatments. The splendid results obtained in the veterans' hospitals in the reconstruction of our disabled soldiers, awakened the medical profession to the value of physical therapeutic agents in the treatment of many pathological conditions.

THE INTERNATIONAL GROWTH OF PHYSICAL THERAPY

At the Second International Congress of Radiology in 1928, 32 countries were represented. The International Congress of Physical Therapy was reorganized and held its fifth session at Liege, Belgium in 1930. It was largely attended and official delegates representing 34 countries were present. The writer was the official representative of the United States Government at this Congress and was elected its vice-president. This international organization will probably hold its next assembly in the United States of America in 1933. Hydrotherapy and physical therapy had their origin and growth in Europe. Practical hydrotherapy developed more rapidly in France than elsewhere. To Germany we are indebted for Winternitz and Roentgen. In order that the importance of physical therapeutic methods be adequately recognized in the treat-

ment of patients—and be on an equal status with other methods of treatment in medicine, 370 German physicians met at Jena, in 1927, and formed the "Physicians' Working Association for Physical Therapy"—instituting regular courses and practice training. The largest university clinics are in Berlin, Leipsic and Jena.

In 1901, there were 5800 institutions equipped with the Zander apparatus in Europe. Every watering place was a hospital, mechanotherapeutically equipped. The Zander apparatus in hospitals is much less common in the United States. Austria was the home of modern hydrotherapy. Florence in 1900 had the best douche apparatus in Europe. Sweden gave us Ling and Zander. Switzerland was the home of Frinkel, who introduced exercise therapy. In Denmark, researches on the influence of light and sun have been made since 1896, with the aid of public institutions run by the State. Much attention has been given to physical therapy in Europe. America has now taken it up and already surpasses Europe in many ways. Now that the American institutions are including physical therapy courses in their curriculum, America will soon excel all nations.

ITS GROWTH IN MASSACHUSETTS AND MASSACHUSETTS MEN, PIONEERS IN THIS FIELD

Inspired by the success of Physical Therapy in Military hospitals, civil hospitals started or developed existing departments of Physical Therapy. In 1907, Dr. Max Boehm had charge of the mechanotherapy department in the Massachusetts General Hospital. The physical therapeutic departments at the Massachusetts General Hospital dated from the introduction of radiotherapy in 1898, high frequency in 1902, mechanotherapy (Zander) in 1904, manual massage in 1904 to the highly complete departments in 1907. For some years prior to 1912, electricity was used in the clinic of the out-patient department for nervous diseases at the Boston City Hospital under Dr. Philip Knapp. Dr. Knapp applied galvanism and faradism as a means of muscle testing and used both of these electrical currents in the treatment of many cases, characterized by organic and functional nerve disturbances. In 1912, there were added physical therapy equipment, enlarged quarters, paid skilled workers and a specialist. Dr. Frank B. Granger, pioneer of physical therapy, was appointed to organize this department. The clinic which has been developed at this hospital, known as the Department of Physical Therapy, is a great credit to our Capital City of Massachusetts. It has grown from a small basement room containing a few pieces of now obsolete apparatus, and treating a very few stray individuals, to the present and new quarters, thoroughly equipped with many and all types of electrical appliances, caring for over 200 patients daily and supervised by a staff of four physicians and twelve physical therapeutic aides, or technicians. The patients are referred from all departments of this busy institution. After thorough examination and diagnosis of their ailments, a coöperative system of progress check-up in each department is carefully and regularly carried out. The results attained have convinced the trustees of the value of this work as an adjunct to the other regular medical and surgical procedures. This is shown by their wholehearted interest in and endorsement of the work. A six months' course in Physical Therapy is given to graduates of Physical Education Schools, Graduate Nurses, etc. Lectures are given by the Head of the Department, and the practical work is under the supervision of the Head Aide and Aides. Students from the Posse-Nissen, Bouvé, Boston, and Sargent Schools of Physical Education have attended this course. This clinic, in the course of time, will no doubt be developed as a research and teaching center for this branch of therapeutics, not only local but also national in its scope.

As early as 1801, Dr. James Thatcher of Plymouth, a Revolutionary surgeon of note, wrote that "massage was too much neglected and yet it was within the power of everyone". In 1859 the eminent Oliver Wendell Holmes predicted that rational hygiene and preventive measures would ultimately rid man of disease. In 1867, Dr. Garratt of Boston was known far and wide because of his varied practical experience in the medical employment of electricity. Hydrotherapy was the subject of discussion at many of the medical meetings. Dr. J. J. Putnam, a member of this society, advocated it in 1899. Dr. Elliott Joslin spoke of the treatment of the skin by concentrated rays of light as one of the most novel advances of the years immediately preceding 1900. Dr. R. T. Edes, another member of this Society, first introduced modern cold bath treatment of typhoid. He used graduated cold full bath, with friction in typhoid cases from 1872, with much success. In 1897, douche apparatus was installed at McLean, Danvers and the Medical Baths in Boston. In 1901, Dr. C. C. Nicola, Superintendent of the New England Sanitarium, wrote a paper on "Fundamentals of Hydrotherapy." Doctors J. J. Putnam and G. W. Fitz told at the medical meeting their experiences with hydrotherapy, creating a great interest. Thus in 1904, Dr. Joseph Pratt and a number of Boston physicians met at the suggestion of Dr. J. J. Putnam to consider the advisability of maintaining an institution for physical therapeutics. Through their efforts a hydrotherapy institution was owned and controlled by the medical profession. The "Medical Baths" were opened December 1904 on the corner of Massachusetts Avenue and Boylston Street. There were 5 small treatment rooms and one large one. Particular notice was given to changes in blood pressure and pulse

due to the baths. This hydrotherapeutic institute won great favor among the medical students. In 1909, Dr. Henry Baldwin spoke highly of hydrotherapy before the Massachusetts Medical Society. In 1912, Dr. Percy Brown read before this society his paper on "Roentgen Rays as a Factor in Diagnosis." In 1924, at the Thorndike Memorial, the first clinic, with *all* types of radiology treatment was installed. Dr. P. F. Butler of the Boston City Hospital was in charge. Credit should be given to several Massachusetts men for some of the electrical apparatus now used. Particular attention should be given to Dr. F. B. Granger, a Fellow of the Massachusetts Medical Society, of the American Medical Association, and a member of the American Roentgen Ray Society. It was he who first organized a physical therapy clinic in the United States Army Hospital. He was made Director of Physical Therapy of the United States in the Surgeon-General's office. In 1926 he was made the first secretary of the Section of Radiology and Physical Therapy of the Massachusetts Medical Society, and chairman the following year. Also he was the first president of the American Academy of Physical Therapy. His book "Physical Therapeutic Technique," published in 1929, has been widely read and greatly appreciated. This is not only because of its educational and scientific contents, but also because of the prominent position he held in the field of Physical Therapy.

Today one of the papers, given in the program for this section, will bring out one of the outstanding developments in the use of high frequency currents: namely, diathermy as a means for the production of heat sufficient to induce artificial fever, to a degree and under a control, which renders this agent a measure of particular value in combating certain of the infections. So far as is known, the first practical demonstration of this possibility of the use of high frequency currents was in research experiments conducted by the writer and his co-workers, in the Department of Physical Therapy, at the Walter Reed Army Hospital, Washington, D. C. during the last war.

Among Massachusetts men, members of this society, which is the oldest medical society in the United States with a record of uninterrupted meetings from its foundation to the present, prominently identified in this field are, Dr. R. T. Edes, Dr. J. J. Putnam, Dr. J. H. Pratt, Dr. Henry C. Baldwin, Dr. Max Boehm, Dr. Frederick H. Morse, Dr. George Ott, Dr. F. H. Williams, Dr. Charles Weld, Dr. Percy Brown, Dr. Frederick O'Brien, Dr. DeWitt G. Wilcox of Boston, Dr. Arthur Ring of Arlington, Dr. Arthur Brown of Winchester, Dr. George E. Deering of Worcester, Dr. Walter Swift, Dr. Elmer F. Otis of Melrose, Dr. Edward H. Trowbridge of Worcester, Dr. George Percy of Salem and many others. Someone has said "there are no true therapeutists, only optimistic physicians". To these and many other doctors, who have proved themselves true optimists, we owe the progress of physical therapy and its present status in the field of medicine. Let me close with Hippocrates' famous adage of 460 B.C. which is the underlying truth in physical therapy today: "Nature heals, the physician is only Nature's assistant."

CHAIRMAN RING: We have fulfilled the request for a history of the subject in this commemoration of the 150th Anniversary of the Society. Each section is to have a history of this sort.

We come now to the reading of the regular papers, the first of which is "Physical Treatment of Mental Illness," by Dr. John A. Holland, of Trenton, New Jersey.

PHYSICAL TREATMENT OF MENTAL ILLNESS*

BY JOHN A. HOLLAND, M.D.†

THE treatment of mental disease has passed through a period of evolution, in succession, from casting out of "devils" to prison chains, segregation in asylums, Freudism, and more recently to intelligent medical procedure. Results of modern treatment have been published elsewhere and need not be repeated. It suffices to state that recoveries and improvements have been more than doubled by the methods outlined here.

Before explaining the treatment, it is necessary to give you a conception of the etiologic factors of mental illness,—the principal ones being heredity, environment and ill health, roughly in the following percentages of importance—heredity, 5%; environment, 10%, and ill health, 85%.

Obviously, nothing can be done about heredity so far as the patient's illness is concerned, and little can be done about environment, but a great deal of good is done by looking at these people as medical problems primarily. Therefore, it is essential that every patient first receive a complete physical examination.

Every mental patient has a physical basis for his symptoms! This statement will be criticized by many psychiatrists who feel that mental reactions are due to psychic factors only, but if you will compare the symptoms of an exophthalmic goitre, chorea with deterioration, paresis

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and toxic delirium, which we know are due to physical factors, to such conditions as neurasthenia, dementia precox and manic depressive insanity, respectively, you will find it difficult many times to make a differential diagnosis on the symptoms alone. Therefore, it has been suggested that mental illness is solely a chronic delirium due to pathologic conditions of an obscure nature, as compared to the acute delirious symptoms manifested in easily demonstrable physical illnesses.

Complete physical examination reveals in practically every case the following pathology: loss of weight; pallor; abscessed teeth; infected tonsils; sinusitis; hypochlorhydria; intestinal stasis; endocervicitis; chronic myocarditis; low blood pressure; leukocytosis; polymorphonuclearpenia; lymphocytosis, and chronic infection in other less usual localities.

Inasmuch as this is a paper on treatment, further details of pathologic findings must be eliminated.

Treatment rests, first, upon the removal of the etiologic factors in so far as possible and, second, rehabilitation of the patient.

The etiologic factors are eliminated by placing the patient in a properly equipped institution with pleasant surroundings and capable, courteous personnel. This changes the patient's environment effectively and allows the physician to work on the patient's physical condition without interference of family and business associations or influences.

After carefully studying the individual patient, the first thing to do is to increase the weight by a high caloric diet and forced feeding, if necessary. Infected teeth and tonsils must be removed and vaccines made from the infected tissues. Other infectious tissue must be removed, if possible, and, if not, vaccines should be used to combat the invading organisms. Colonic irrigations are used to secure proper intestinal elimination.

Not until all these have been done can you hope to secure any benefit from physiotherapy, although treatments are run coincidentally with surgical measures. The fact remains, however, that while physiotherapy is of wonderful assistance in curing mental illness, yet it must be borne in mind that physical modalities alone are of little value.

Neither can surgical methods without physiotherapy serve a useful purpose. It is only by combining the two methods with the judicious use of sera and vaccines that any hope of mental cure can be established.

Specifically speaking, the modalities used in treatment are diathermy, sine wave, actinic ray and colonic irrigations. Baths and packs are of little use, although the former have some value in promoting elimination and as a cleansing agent. Packs are detrimental to the health of the patient and have been used as a means of restraint in the guise of scientific treatment.

It hardly seems reasonable to connect diathermy with mental symptoms, but if you will bear in mind that intestinal stasis is largely responsible for mental symptoms, and that intestinal stasis is caused by adhesions, you will easily see the indication. When the first investigations of colon pathology were made, colectomies were performed to eliminate the stasis. Unfortunately, the patients were often eliminated also. Nevertheless, it was found that severe adhesions did exist. These bands have been described as either Jackson's membrane or Lane's kink. Generally conceded to be harmless in the early stages, these membranes contract and rotate the colon outward and at the same time constrict the gut. Severance of these adhesions allows the gut to function normally again, but to prevent operation in the milder cases, as differentiated by x-ray studies, the tissue is heated by diathermy to soften the adhesions and the sine wave treatment is used immediately afterward, as well as colonic irrigations. Patients that do not respond to this procedure, must be operated and then the procedure repeated as soon as possible, remembering the danger of postoperative hemorrhage. At least three or four days should elapse after an abdominal operation before diathermy is started.

In the preoperative stage,—the plates should be so placed as to carry the maximum amount of heat to the area of adhesions, as shown by the x-ray study.

In addition to softening adhesions, it is believed that general heating of the intestinal tract stimulates metabolism by increasing the blood supply in the abdominal organs and inhibits the growth of pathologic bacteria.

As surgery alone cannot cure these patients and must be used with physiotherapy, so any one physical modality is useless without the others. While diathermy is being used, the sine wave and colonic irrigations must be used concurrently. The custom in hospital work has been to alternate treatments as much as possible, using colonic irrigations one day and diathermy followed by sine wave the next day. The duration of the treatment depends on the degree of pathology and the progress of the patient.

The sine wave has already been mentioned. Used with diathermy and colonic irrigation, it is most effective. Bowel movements are increased to three daily and then the treatments are gradually withdrawn so that the bowels will continue to function properly. Best results are obtained by placing the electrodes posteriorly at the level of the lower thoracic vertebrae parallel to each other and to the spinal column and about three inches apart, the size of the electrodes being approximately two by three inches. The frequency of alterations should be eight to eleven per minute.

Ultraviolet radiation is quite useful for its metabolic effect and whole body exposures are

generally used. The air-cooled quartz light is good, but the carbon-arc is preferred by the essayist because of apparently better results. During the summer months, it is better to replace artificial light with sunlight. No artificial light in our experience has given as good results as has sunlight.

Colonic irrigations are extremely valuable in the treatment of intestinal stasis and to increase elimination. Most of the patients with mental disease have a mild nephritis, and it is found that when the elimination of the gut is enhanced, the albuminuria disappears. The only contraindications that we have found are chronic appendicitis and acute hemorrhagic colitis. Properly given over a sufficient length of time, colonic irrigations will establish normal fecal movements and tend to decrease the size of the gut rather than dilate it. We have felt that in addition to the cleansing solution used, the exercise of the muscular wall of the gut is of great value. The technique is as follows:

The patient lies on his left side to start and a special rectal tube with round end and staggered fenestra is introduced into the rectum to the extent of four or six inches. The tube should be sufficiently large to prevent leakage from the rectum. The commonly used tube is twenty m.m. in diameter, although larger and smaller tubes are indicated occasionally. The tube is not introduced further because of the possibility of rupturing the gut, one case of which is on record. Of course, this means a fatal issue and inasmuch as the colon can be thoroughly cleansed without further introduction, it seems that the risk is unnecessary.

Water at the temperature of 105 degrees Fahrenheit is introduced and withdrawn in increasingly large amounts which depend upon the comfort and coöperation of the patient. When the descending colon is clean, which is determined by the return of clear water, the temperature of the fluid is reduced to sixty-five degrees Fahrenheit. This causes a contraction of the gut and more feces are removed. When the water again returns clear, the patient is placed on his abdomen and the process repeated. When the cold water again returns clear, the patient is placed on his right side and the process repeated the third time. The duration of the treatment is from one-half hour to one hour. It must be done gently with very little water pressure. Ordinary enemas are insufficient to accomplish this purpose and a special apparatus must be obtained to accomplish the best results.

Many solutions have been tried, including a solution of antiseptic dyes and lactic acid, bicarbonate of soda, saline, etc., but it is felt that the use of plain warm and cool tap water accomplishes the best results. Acidophilus milk was implanted in a series of cases directly into the colon following each irrigation, but it was found that this developed a colitis and the patient lost weight. In all, the latter treatment was unsatisfactory. The total amount of water used need not be measured, as is often done, unless the patient wishes to brag about the amount used to clean him out.

It must be borne in mind that the above description of the value of physiotherapy is confined to purely psychotic conditions and must not be used in the presence of usually accepted contraindications. During the course of a mental illness, concurrent physical illnesses occur and such are to be treated in the usual manner.

Physiotherapy has assisted greatly in the treatment of pneumonia, anemia, multiple neuritis, varicose ulcers and so on, but as these treatments are aside from the purpose of this paper, the details will be omitted.

Experiments are being conducted with diathermy in the treatment of paresis, but like all other newer forms of therapy, it must be tried over a period of years in a sufficient number of cases to prove its worth.

In the short space of this paper, it is impossible to give details or statistics to prove these statements and the essayist can only report the results of more than ten years' study of approximately seven thousand patients. This is not a final report at all, but it is hoped that you will have a better understanding of what is being done to alleviate and cure conditions that were formerly considered hopeless.

The shortest time for the completion of successful treatment is approximately three months for men and four months for women. There seems to be no explanation at this time for this difference between the sexes. The longest time has not yet been determined. It pays, however, to persist patiently with treatment. Patients who had been ill from three to seven years have been returned to society in a normal condition, although they were apparently hopeless when treatment was begun. Never be pessimistic about the future of mental patients and above all do not neglect them when an unfavorable prognosis is made. When you feel that everything has been done that can be done, you are wrong. That is just the time to "take a hitch in your belt" and redouble your efforts, and continued optimistic research will reward your efforts to an amazing degree.

CHAIRMAN RING: The next paper is entitled "Hyperthermia in Dementia Paralytica." Dr. Perkins, of Worcester, has been making an intensive study of this subject from the laboratory as well as from the technical side. He has told of the technical side and is going to tell of the laboratory side this morning.

HYPERTHERMIA IN DEMENTIA PARALYTICA*

I. Blood Chemistry Studies

BY CLIFTON T. PERKINS, M.D.†

THE effects of hyperthermia on the human organism are important from many points of view. A more thorough knowledge of these effects is becoming increasingly necessary as the scope of our therapeutic measures broadens, and as our medical curiosity leads us on to explain more or less obscure phenomena. The elucidation of heat prostration, for example, or the mechanisms by which diathermy works in the treatment of dementia paralytica, are dependent upon a rather detailed knowledge of these effects. Our particular interest, in the research to be reported, has been in the analysis of the therapeutic efficiency of hyperthermia in the treatment of dementia paralytica. The research program has not been limited to the mental changes alone, but has been broadened to include studies of various body tissues and fluids as modified by hyperthermia. The purpose of this paper is to present briefly the chemical changes in certain blood extractives incident to the above treatments.

METHOD

So far as possible, all patients were subjected to the same control standards and methods of treatment. Although the detailed technique employed for this purpose has been outlined in the research protocol of a previous article[1], the more important steps may be summarized here. All patients were suffering from the same disease, namely dementia paralytica, and were receiving treatments primarily for this disease. There was

*Read before the Section of Radiology and Physiotherapy of the Massachusetts Medical Society at its Annual Meeting at Boston, June 9, 1931.

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FIG. 1. Anterior electrode in position.

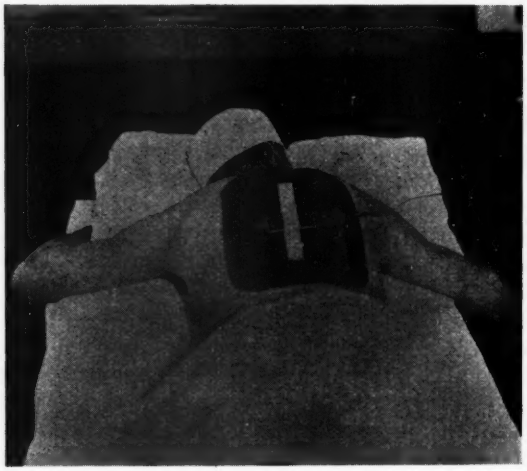

FIG. 2. Posterior electrode in position.

FIG. 3. Patient ready for treatment—insulated against heat loss and atached to ordinary diathermy machine. The small machine is a specially constructed pyrometer for continual observation of rectal temperature.

no demonstrable kidney impairment in any of these patients before treatment. In order to prevent so far as possible blood concentration phenomena, each patient was allowed to drink all of the tepid water he desired during the treatments. This amounted to an average of approximately 1650 c.c. per patient per treatment. The diets were carefully regulated so that each patient in the series reported received an average of 2519 calories per day divided as follows:— protein, 305 calories, or 76 grams; fat, 734 calories, or 81 grams; carbohydrate, 1479 calories, or 369 grams.

The electrodes were of a ductile alloy, 41/1000 inches thick. Although varying a great deal in contour, as may be noted in Fig. 1 and Fig. 2, nevertheless the surface area of each was alike—308.102 sq. cms. After applying the electrodes and carefully insulating the patient to prevent heat loss, he was ready for treatment, as illustrated in Fig. 3. An average of 3500 milliamperes of current were applied, from an ordinary diathermy machine, until the rectal temperature was raised to 105° F. This required an average of 2½ hours, at the end of which time the patient's temperature was allowed to subside to normal. Such treatments were given daily, 5 days a week for two weeks, making a total of 10 treatments. In the occasional patient, it seemed unwise to complete the entire series, and therefore treatments were stopped before the prescribed and empirical number of 10 had been completed. These patients may be detected in the accompanying tables, inasmuch as the second column in these tables indicates the number of treatments given each patient.

Samples of blood for chemical analysis were taken at the following intervals:— (1) one to three days before receiving any treatments; (2) at a temperature of 105° F. during the first treatment; (3) at a temperature of 105° F. during the last treatment; (4) within 3-5 days after the series of treatments was completed. From these samples the protein-free blood filtrate was prepared after the method of Folin and Wu. The determination of non-protein nitrogen, urea,

TABLE 1

BLOOD CHEMISTRY

No.	No. of R	Non Protein N				Urea N				Sugar			
		Before R	105° 1st R	105° Last R	After R	Before R	105° 1st R	105° Last R	After R	Before R	105° 1st R	105° Last R	After R
15	10	29	33	33	30	14	14	15	12	79	116	99	94
37	10	31	35	50	33	16	19	37	19	87	122	154	89
36	10	27	32	23	29	12	15	8.5	15	104	96	105	87
20	10	32	36	40	—	14	17	19	—	124	101	138	—
16	10	35	35	40	37	16	19	20	20	104	133	133	109
28	8	30	27	—	27	8.5	3.3	—	14	122	143	—	89
41	5	27	30	—	—	11	12	—	—	111	111	—	—
38	7	26	33	—	33	12	16	—	16	78	111	—	87
22	8	33	35	—	—	17	13	—	—	97	125	—	—
13	4	32	41	43	29	18	19	—	15	97	125	103	89
14	10	28	32	37	29	11	—	16	16	92	108	100	97
35	10	36	36	35	29	11	16	14	15	121	127	118	88
44	10	26	33	31	38	11	17	17	15	89	133	128	100
25	10	32	—	32	29	12	—	15	16	108	—	95	103
42	11	30	26	29	35	12	12	12	13	102	119	125	104
45	5	32	31	—	—	15	14	—	—	103	184	—	—
32	10	33	40	25	—	14	21	14	—	95	125	—	—
30	10	29	29	27	27	11	14	16	16	116	125	162	100
29	10	29	32	—	32	10	15	—	13	67	114	—	94
10	10	40	34	35	30	18	17	17	15	105	108	106	117
26	6	30	36	—	30	12	17	—	15	105	182	—	87
43	10	33	37	38	29	14	24	20	17	93	101	102	101
12	10	33	37	40	26	14	19	19	17	107	116	130	118
40	8	40	43	—	33	18	17	—	19	95	125	—	100
11	10	26	36	30	—	11	14	12	—	100	115	118	—
31	10	27	34	29	27	18	20	19	17	91	118	129	123
27	10	25	32	30	33	11	15	17	13	122	133	108	101
9	10	31	33	33	38	16.5	13	14	14	118	111	97	120
21	10	30	35	29	—	14	14	11	—	92	97	125	—
19	10	37	40	—	31	13	15	—	17	72	104	—	101
23	10	24	34	41	32	11	13	16	12	98	118	160	120
46	10	32	34	37	32	16	14	24	16	90	115	114	78
47	10	30	36	32	33	18	18	12	18	125	114	105	91
48	10	36	—	33	33	22	—	16	17	105	—	126	108
49	10	28	34	25	23	10	13	11	10	105	110	106	108
Ave.		30.8	34.3	33.7	30.9	13.8	15.6	16.5	15.5	100.5	120.7	119.5	99.08
			+11%	+9%	±0		+13%	+19%	+13%		+20%	+19%	−1%

creatinine, and sugar (glucose) were made by the Folin and Wu method, whereas uric acid was determined by the Benedict method.

TABLES 1 AND 2

For the purpose of statistical analysis, the patients are divided into two groups, based on a correlation of the physical end-results of treatment and blood chemistry determinations. The prescribed 3-5 days after treatments. From further isolated observations, one may deduce that the urea eventually declined to approximately the starting figure, but the average time required for this change is not known.

The blood sugar ran rather parallel to the non-protein nitrogen except that the increase was 20%, which subsided to the starting figure within 3-5 days after treatments. The possible

TABLE 2

BLOOD CHEMISTRY

No.	No. of B	Uric Acid				Creatinine			
		Before B	105° 1st B	105° Last B	After B	Before B	105° 1st B	105° Last B	After B
15	10	4.0	3.2	1.9	3.8	1.3	1.1	1.2	1.2
37	10	4.1	4.5	4.2	4.0	1.2	1.4	1.5	1.7
36	10	3.0	3.1	3.5	3.2	1.1	1.1	1.2	1.4
20	10	4.1	4.8	7.3	—	0.9	1.2	1.6	—
16	10	3.4	2.5	5.3	3.3	1.1	1.3	1.1	1.3
28	8	3.2	—	—	3.0	1.4	1.1	—	1.2
41	5	3.8	3.9	—	—	1.2	1.2	—	—
38	7	3.1	3.5	—	3.5	1.5	1.2	—	1.4
22	8	5.7	3.9	—	—	1.4	1.1	—	—
13	4	3.5	3.5	2.7	2.9	1.4	1.4	—	1.4
14	10	2.8	3.0	2.9	3.8	1.6	1.3	0.9	1.4
35	10	4.2	4.4	5.3	3.4	1.1	1.4	1.4	1.4
44	10	2.9	3.0	3.5	4.7	1.1	1.3	1.2	1.2
25	10	5.0	—	3.8	4.2	1.1	—	1.3	1.4
42	11	3.0	2.8	2.9	4.7	1.2	1.4	1.2	1.2
45	5	3.8	3.8	—	—	1.1	1.3	—	—
32	10	3.0	2.9	1.4	—	1.2	1.4	—	—
30	10	3.4	3.8	3.8	3.6	1.2	1.4	1.4	1.4
29	10	3.1	3.7	—	3.6	—	1.2	—	1.4
10	10	3.3	3.2	2.9	3.2	1.5	1.4	1.4	1.4
26	6	3.9	3.9	—	4.0	1.2	1.2	—	1.4
43	10	3.9	4.2	4.1	3.4	1.2	1.4	1.1	1.1
12	10	3.6	3.6	4.0	3.4	1.5	1.4	1.4	1.6
40	8	4.3	3.6	—	4.2	1.5	1.2	—	1.4
11	10	3.5	3.9	2.8	—	1.5	1.2	1.3	—
31	10	3.6	4.4	3.2	3.6	1.1	1.3	1.3	1.4
27	10	3.2	3.5	3.8	3.8	1.0	1.1	1.4	1.4
9	10	3.6	3.2	3.1	5.3	1.4	1.1	1.0	1.2
21	10	3.8	3.5	4.2	—	1.2	1.1	1.5	—
19	10	2.9	3.1	—	3.4	1.1	1.0	—	1.1
23	10	2.3	5.3	3.3	3.2	1.3	1.3	1.5	1.3
46	10	4.4	4.4	4.4	3.5	1.2	1.6	1.2	1.3
47	10	4.3	3.8	4.1	4.0	1.5	1.8	1.2	1.4
48	10	4.6	—	3.9	3.8	1.3	—	1.3	1.3
49	10	3.7	3.6	3.2	3.1	1.1	1.1	1.7	1.5
Ave.		3.6	3.7	3.7	3.7	1.25	1.27	1.3	1.35
			+3%	+3%	+3%		+1%	+4%	+8%

first group of thirty-five patients is indicated in Tables No. 1 and No. 2. All of these patients completed the treatments uneventfully.

It will be noted that there was an average increase of 11% in the non-protein nitrogen during the first treatment, which was sustained, within the limits of laboratory error, to the last treatment, and fell back to the starting figure approximately 3 days after the series had been completed. The urea in this group showed an increase of 13% during the first treatment, rising to 19% at the height of the last treatment. This did not subside to the starting figure, but did decline to a net increase of 13% during the

influence of the emotions on the blood sugar response seems to be negligible inasmuch as there was no appreciable change between the determination during the first and last treatments, and also because the majority of the patients were sleeping during the greater part of the treatments and showed no active emotional response.

The very slight increase in uric acid determination seems to be within the limit of laboratory error and therefore is not considered significant.

There was a gradual increase in the creatinine determination rising to 4% at the height of the

last treatment, and to 8% in the 3-5 day interval after the series was completed.

It will be noted in all of the above factors where there was an increase during treatments that this increase, though definite, did not exceed the normal limits.

TABLE 3

The second group of four patients indicated in table 3, represents fatalities due either directly or indirectly to the treatments. Patients No. 17, No. 18 and No. 33 expired apparently because of heat exhaustion.

In the blood chemistry analysis, it will be noted that in every factor except creatinine, the starting figure was higher than the mean average of the patients in the first group. The increase of all factors during and after treatments was rapid, and again, in all except creatinine, far exceeded the normal limits.

The non-protein nitrogen increased 116%, 142%, sugar 88%, creatinine 91%, and the uric acid again showed the least percentage increase, although this was 80%.

TABLE 3

BLOOD CHEMISTRY

No.	No. of R	Non Protein N — Before R	Non Protein N — 105° 1st R	Non Protein N — 105° Last R	Non Protein N — After R	Urea N — Before R	Urea N — 105° 1st R	Urea N — 105° Last R	Urea N — After R	Uric Acid — Before R	Uric Acid — 105° 1st R	Uric Acid — 105° Last R	Uric Acid — After R	Creatinine — Before R	Creatinine — 105° 1st R	Creatinine — 105° Last R	Creatinine — After R	Sugar — Before R	Sugar — 105° 1st R	Sugar — 105° Last R	Sugar — After R
17	10	40	43	60	75	21	21	30	32	2.8	2.9	4.2	5.0	1.0	1.2	1.1	1.1	101	117	182	250
18	4	34	46	60	—	14	19	32	—	3.8	3.7	6.1	—	1.1	1.2	1.2	—	111	185	178	—
33	4	32	40	—	—	14	19	—	—	4.2	4.7	—	—	1.1	1.4	—	—	98	125	—	—
50	2	35	31	40	77	17	17	20	48	4.2	4.1	4.0	8.5	1.1	1.3	1.5	3.0	103	107	224	105
Ave.		35.2	40	52	76	16.5	19	27.3	40	3.75	3.85	4.76	6.75	1.07	1.27	1.27	2.05	103.2	133.5	194.7	177.5
			+13%	+48%	+116%		+15%	+66%	+142%		+2%	+27%	+80%		+18%	+18%	+91%		+29%	+88%	+72%

1. Hyperthermia, in the form of ordinary diathermy, as applied in the treatment of dementia paralytica, results in the following changes of the blood extractives of the average patient:

   (a) N-P-N—approximately 10% increase, returning to the starting figure within 3-5 days.
   (b) Urea—approximately 13% increase, which does not return to the starting figure as readily as the N-P-N, i.e., within 3-5 days.
   (c) Sugar—approximately 20% increase, which returns to the starting figure within 3-5 days.
   (d) Uric Acid—no significant change.
   (e) Creatinine — approximately 4% increase, which increases slightly more during the 3-5 days following treatments.

2. These changes represent increased catabolism, which, in the average patient, is fairly well compensated, and therefore the changes in blood chemistry do not exceed the so-called "physiological limits".

3. In the occasional patient, who appears to

CONCLUSIONS

Although the groups briefly discussed above are comparatively small in numbers, nevertheless they have been so controlled, and the average blood chemistry changes noted during and after the hyperthermia treatments appear to be sufficiently great as to eradicate the individual variation factor and laboratory error. The groups may, therefore, lend themselves to a valid and careful statistical analysis, warranting the following tentative conclusions:—

be in good physical condition, there is a danger of heat exhaustion. This danger seems to be materially increased on extremely hot and humid days. In such a patient, one may expect catabolism, as indicated in the blood chemistry determinations, to be uncompensated and to far exceed the "physiological limits", leading to fatality. High initial non-protein nitrogen, urea, and uric acid levels followed by a rapid elevation of these blood components in the early stages of treatment, should be regarded as presumptive evidence of impending danger.

REFERENCE

1 An article by the writer entitled "Diathermy Treatment of Dementia Paralytica", read before the American Academy of Physical Therapy November 14, 1930, and now in press. To appear soon in the American Journal of Medicine.

Discussion

Chairman Ring: These two papers, Dr. Holland's and Dr. Perkins', are now open for discussion. There has been no particular discusser appointed. I hope those on the floor will ask questions of Dr. Holland and Dr. Perkins.

Dr. Dickinson: I was somewhat interested in the first paper. So far as I know and believe, nearly all of the people who are mentally ill are more or less constipated.

It seems to me that some of the work of Dr. A. J. Carlson, University of Chicago, Physiological Laboratory, is almost proof that we cannot gain very much in the treatment of these mentally ill people who are constipated, when the seat or cause of the trouble is probably in the brain. Where constipation is at the root of the difficulty, it would seem that this treatment of Dr. Holland's sine wave and colonic irrigation would be a very fine thing. He did not say, but I suppose that he also takes care of the mental condition. I should think it would be important.

Dr. P. H. Greeley, Portsmouth, N. H.: *Mr. Chairman and Gentlemen*—It is a double pleasure to find Dr. Holland here this morning and to listen to his address. This is the second time he has come to New England to speak to medical men. I feel that we are greatly indebted to him for coming all the way from Trenton to relate his experience in the treatment of mental disease by detoxication. I find that the claims of the men at the Trenton State Hospital are becoming accepted more generally. Especially is this true in the South and West. All that is needed to get rid of our skepticism is to try out these methods in practice. One will be surprised to find that many chronic conditions which have always been considered incurable, and which are still incurable by any other known method, can be completely done away with.

The task is not an easy one and the man who tells his patient to get rid of the infected teeth or tonsils and see what happens will never get very far. Thoroughness is the keynote to success in this work.

I once called on Dr. Philip Norman of New York City, the inventor of the Norman Irrigation Table, to see what I could learn regarding colonic irrigation. Before going into the subject of irrigation, he talked very forcibly on the folly of cleansing the colon and then, without any instruction on the subject of diet, allowing the patients to eat more of the rubbish that had gotten them into their trouble. He said it was time the physicians had given the public something constructive in the way of education in dietetics. He might have added that it is time we had learned better than to give medicine that stimulates colonic peristalsis with resulting powerful reverse peristalsis followed by ileocecal incompetence resulting in poisoning from absorption of colonic material from the mucous membrane of the small intestine. The benefit derived from cleansing mucous membranes in other parts of the body is well known. It seems very likely that the mucous membrane of the colon, the contents of which are largely made up of bacteria of all sorts, should be a frequent seat of infection, and when we remember what is done for the infected mucous membrane of the upper respiratory tract, and for cystitis, by cleansing methods, it is only to be expected that irrigation of the infected colon should yield great results.

One thing that we must learn is the perfectly deplorable condition in which the colon may be without causing anything but general symptoms. There is nothing referred to the colon like pain and tenderness to give us a clue to the cause of the patient's illness. That many seriously diseased colons are x-rayed and pronounced perfect is too true. A more careful study with the fluoroscope would prevent many of these serious mistakes. Microscopic and chemical examination of the contents is a great help in diagnosis.

That there are many factors which enter into the cause of insanity cannot be denied, but to attend to the mental and neglect the general health is a very serious mistake.

Dr. Dickinson: I would like to say just a word in regard to the physiotherapy department of the Boston City Hospital. Dr. McFee and myself are visiting physicians there. We both feel that doctors generally fail to realize the work that is being done and the system of check-up that is followed.

The patients are sent in to the physiotherapy department for treatment after passing through the medical department, surgical, fracture, etc., and other departments. I think every doctor in the institution sends cases there. They are treated for a certain period of time with physiotherapy and are then returned to the department from which they came for check-up. The doctor there goes over the case and, if fur-

ther treatment is needed, the patient is returned to us.

I feel it is one of the most ably conducted institutions of its kind in the country. The men in charge in that institution are competent executives.

If any doctor would like to visit the department I know that, so far as Dr. McFee and myself are concerned, we would be very glad to see him.

DR. OTT: I very much appreciated Dr. Holland's clear dissertation on the pathology found.

If the time will allow, I should like to ask if he would kindly give us in his summary a short description as to how such poison is being absorbed in the condition of incompetent ileocecal valve and whether he has been able to find that the toxins are absorbed from the colon itself or from the ileum.

DR. MCFEE: I would like to have Dr. Perkins tell us whether at his institution there has been any observation of the use of this principle of diathermy in treating some of the acute infections like influenza, or if he can give us any report concerning such application of high frequency current.

DR. HOLLAND: In regard to Dr. Dickinson's remark with reference to the cause being in the brain, I mentioned that we felt that all these mental diseases were due to physical phases. Whether it is in the brain or in the colon primarily we do not know. We do know that by cleaning out the colon we get results.

It is really a vicious circle. A business man in perfect health becomes more or less tired in the afternoon. He doesn't feel so well as he might and becomes irritable, quarreling with his family. You may inquire and find that that man is constipated. When you clean out his intestinal tract, his inability ceases and he goes about as well as he did before.

We feel that primarily this is a pathologic condition in the colon. There are other infectious conditions in the body as well as in the intestines. We feel that it is probably due to some infection in youth, such as typhoid, and these infections stay in the body and do much harm. If the patient neglects himself there is a mental side to the problem, too. If he is depressed he is not so anxious to have a bowel movement, there is a vicious circle, and the time comes when the patient breaks down mentally. Personally I do not think that there is any mechanical or psychic point in the brain itself which will start the vicious circle.

I avoided mention of the glands of internal secretion. We know that the adrenals are disturbed, and we know that the thyroid and gonads are involved. That apparently is outside the scope of this paper and I did not want to include it.

I feel that these glandular defects are due to chronic toxemia and chronic infection. By treating the infection with the appropriate therapy, we can get results.

Much of my practice has been in trying to keep patients out of state hospitals. We feel that, if these patients can be treated in general hospitals, it is to be preferred. Don't say, "I can't handle this patient; I will send him to the Boston Psychopathic." All of those institutions are overcrowded. I do not know of any institution that has a large number of vacant beds. I think it is up to us. If a man is sent to a state hospital for two or three weeks or a couple of months and he tries to get a job when he gets out, he will see how hard it is.

In regard to Dr. Ott's question about toxins being absorbed in the ileum or the colon, the pathology of the ileum is simply an extension from the colon, and I think the colon becomes involved first.

CHAIRMAN RING: Dr. Perkins, will you close the discussion?

DR. PERKINS: I realize that the presentation this morning is more or less along technical lines. I do not believe we can study any one problem adequately as a whole and skim over it lightly. In order to go into the research problems and understand what we are dealing with, whether it is medical diathermy or radio frequency, we must integrate the whole into its component parts and study each one of these parts so far as possible. For our purpose today, we limited the study on hyperthermia to its effect on blood chemistry. We have made many other studies such as the effects of hyperthermia on basal metabolism, blood counts, urine constituents, etc., but the time allotted and, I dare say, your patience would not permit going into these detailed studies at the present time. They, however, would probably be interesting and instructive.

In answer to Dr. McFee's question with regard to the treatment of infectious diseases, I will say that I do not feel qualified to give an adequate answer. The research work in hyperthermia which we have been doing at the Worcester State Hospital has been limited to general paresis and syphilis of the central nervous system. It seems logical to me that before expanding too widely into the field of acute infectious diseases, it would be well to know a great deal more about the responses of the human body to these high frequency currents. For example, it would seem necessary to have more knowledge of the blood count response to hyperthermia, how much additional burden these treatments put on the kidneys, etc. We are making detailed studies along these lines at the present time. About a month ago, I attended a meeting at the University of Rochester where there was gathered a group of prominent physicians and physicists, who were interested in this problem of hyperthermia research. One of the physicians reported the use of hyper-

thermia in the treatment of arthritis. He did not give detailed results, however, as his series at that time was not sufficiently large to warrant any tentative conclusions.

There is one point which was omitted in the technical part of the paper, and it may be of interest to those of you who have a particular interest in the physics involved in these treatments. Svenstrom has shown rather conclusively that the resistance of the average human chest to an electrode of 300 square centimeters is approximately 60 ohms. I was not aware of that figure when we made our first electrodes, but as it happened these electrodes correspond very closely to the size that Svenstrom used; that is, they were each 308.102 square centimeters in area.

Many practicing physicians during the past few weeks have asked me the practical application of the blood chemistry findings enumerated. Offhand, there comes to me one immediate possibility. In the so-called gravity shock, there are three things that are almost always constant. First, there is a decrease in the body temperature, secondly, a decrease in blood pressure, and finally, there is usually a decrease in the blood sugar. In our studies we can say definitely that these hyperthermia treatments raise the body temperature, for the most part raise the blood pressure somewhat, and finally, as demonstrated this morning, they raise the blood sugar. Therefore, one might reason that such treatments might be used as an adjunct to the routine treatment of gravity or surgical shock.

CHAIRMAN RING: Is the Committee on Nominations ready to report,—Dr. O'Toole?

DR. O'TOOLE: The Nominating Committee wishes to report the names of officers of the Section on Radiology and Physiotherapy for the coming year:

For Chairman, Dr. Ralph D. Leonard;
For Secretary, Dr. Edward Trowbridge.

DR. MCFEE: I move that nominations be closed and that the secretary be instructed to cast the ballot of this section for the names as read.

(The motion was seconded, put to a vote and carried; whereupon the secretary complied with the request contained in the motion and Drs. Leonard and Trowbridge were declared elected.)

CHAIRMAN RING: We will now proceed to the next paper, "The Value of Hysterosalpingography," by Dr. Samuel A. Robins, of Roxbury and Dr. Albert A. Shapira, of Jamaica Plain.

THE VALUE OF HYSTEROSALPINGOGRAPHY*

A Study of 1000 Cases

BY SAMUEL A. ROBINS, M.D.,† AND ALBERT A. SHAPIRA, M.D.†

INTRODUCTION

THE diagnostic value of hysterotubography is just as important to the gynecologist as pyelography is to the urologist. From our observations we have been able to establish diagnoses in obscure cases of pelvic disorders and correct previous errors, by the aid of the roentgenological exploration with iodized oil of the female genital tract. In numerous instances, as a result of the information obtained, ether examinations became unnecessary and exploratory operations were often obviated. On the other hand, an unexpected pathological condition requiring operation or treatment was often encountered.

To advance knowledge in the interpretation of the roentgenograms, the collaboration of the gynecologist and the roentgenologist is needed and in this way it is our belief that this procedure will become universal and indispensable.

Such methods become necessary because of the limitations and inadequacy of bimanual examinations in certain cases, even if performed under anesthesia, such as occur in obese patients or in those women who are neurotic and in whom it is practically impossible to get sufficient relaxation for a satisfactory examination.

Intrauterine insufflation made a definite advance in the study of the causes of sterility, but the actual visualization brought about by the use of opaque media adds considerable information and, as we shall point out, in many instances acts as a therapeutic agent. This procedure is unquestionably "putting eyes into the fingertips" of the gynecologist.

With the introduction of uterotubography by Heuser[1] in 1924 this method has received widespread attention as evidenced by the literature on the subject.

Our observations are based on one thousand cases, demonstrating the following conditions: the normal uterus and tubes, malpositions, malformations, partial and total occlusion of tubes, isthmospasm, kinks and adhesions of tubes, hydrosalpinx, tuberculous salpingitis, ovarian cysts, intraligamentous fibroids, hyperplastic uteri, fibroids and cancer of the uterus, polypi of uterus, spasm at the internal os, endometri-

*From the Departments of Roentgenology and Surgery, Beth Israel Hospital, Boston, Mass.
Read before the Section of Radiology and Physiotherapy, at the Annual Meeting of the Massachusetts Medical Society, Boston, June 9, 1931.

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tis, hydatidiform mole, pregnancy, and pathological conditions of the cervix.

ANATOMY

In order to interpret pathological conditions it is important to know normal anatomy. We must bear in mind that by the method of uterosalpingography only the cavities of the cervix, uterus and tubes are seen since the iodized oil fills only the cavities.

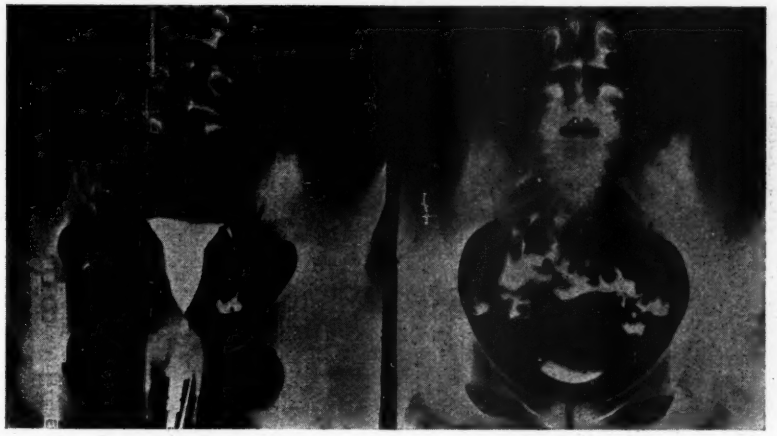

FIG. 1.

Normal uterus and tubes.

Oil disseminated throughout the pelvis 48 hours after the injection, demonstrating patency of tubes.

The normal uterine cavity is triangular in shape, the base at the fundus and the apex directed below, at the level of the internal os. The lateral borders are usually slightly concave, occasionally quite straight, and rarely convex in the normal uterus despite the great pressure which may be exerted by the instillation of the contrast media. We have repeatedly injected uteri at autopsy and have found that distention of the cavity takes place practically entirely in an anteroposterior direction and negligibly in the lateral diameter. The average measurements are 3.8 cm. across the fundus and 3.4 cm. from the uterine cornua to the internal os. The fundal border is usually concave, occasionally straight, and rarely slightly convex.

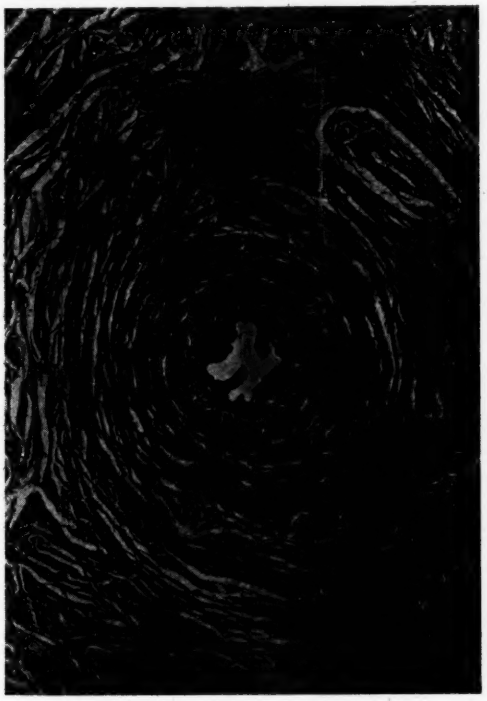

FIG. 2. Cornual sphincter. Note circular arrangement of fibers.

Just beyond the upper angles of the triangle are the tubal sphincters. We have been most interested in these so-called sphincters, especially on account of their relation to sterility. They have been described by Reinberg and Arnstam[2], Schneider and Eisler[3], Cotte and Bertrand[4], and others. In the region of the uterine cornua, where the tubes begin, there can be demonstrated in about two-thirds of the cases an annular-like shadow of about one to one and a half millimeters in diameter. Arnstam has shown a good microphotograph of this sphincter. We have tried a great many times to show this sphincter microscopically from sections taken from specimens removed at operation. In only a few cases did we succeed in demonstrating a real sphincter-like arrangement of the smooth muscle fibers around the isthmic portion of the tube. We now believe that this is a true anatomical structure, that it is significant of a contraction apparatus at this part of the tube, and is comparable to the pyloric sphincter of the stomach. It is seen in patent as well as in occluded tubes and, strangely enough, it is demonstrated even in extirpated uteri. The failure to demonstrate the sphincter is no doubt explained by the fact that at the particular time of injection or x-ray exposure the sphincter was not in action.

The capacity of the normal uterus and cervix is about five to eight c.c. The infantile uterus and senile uterus hold one to four c.c. The hyperplastic and fibroid uteri will take from ten to sixty c.c. or more.

The normal tubes present themselves as fine

threadlike lines which begin at the upper angles of the uterine cavity and pass in a general direction laterally to the sides of the pelvis for a variable length of approximately seven to ten centimeters. This line suddenly ends in an irregular large, dense, fairly uniform shadow of variable size. This latter portion represents the ampulla of the tube and with it some of the lipiodol which has leaked out into the pelvic cavity. The fine line represents the interstitial and isthmic portions of the tube. There is no

FIG. 3. Anteflexed uterus.

set direction or position of the tubes. They may be convoluted, may be directed upwards, downwards, or may even cross from one side of the pelvis to the other. The normal tubes are patent and the lipiodol should be seen throughout their course. Occasionally, owing to incomplete filling, the tubes may not be completely outlined, and it is difficult to decide whether they are patent or not. In such cases a plate taken about forty-five minutes later will be of great service and if the tubes are patent the oil will be found free in the pelvic cavity. Occasionally it takes longer to determine the patency and, when in doubt, we take roentgenograms one to three days later or else repeat the injection.

MALPOSITIONS

An anteflexed uterus presents the picture of a drooping lily. One sees the general triangular outline but the region of the fundus is marked by a transverse, more or less elliptical shadow. In retroflexion practically the same picture is seen. It is often difficult to differentiate these two malpositions on the flat film. Stereoscopically, however, one can readily make out the position. A lateral view is of assistance but we rarely see the necessity for this procedure since we get practically all our information from our routine stereoscopic views. In marked retroversion flexion or anteflexion with the cervix high, the level of the fundus is lower than the internal os and thus the relation of the base of the triangle to its apex is reversed. Frequently, the uterus may be deviated to one side of the pelvis or the other. Its position is readily noted.

MALFORMATION

There are certain malformations which show very precisely on the roentgenograms—i.e., the infantile uterus, the bicornate uterus, and the double uterus. Pictures of these conditions are shown below so that a description is hardly necessary. The importance of a definite knowledge of the character of the uterus is quite evident, especially when by bimanual examination we are often left in the dark. Only recently we knew of a case where a patient was operated on with a preoperative diagnosis of tubal pregnancy. At operation no extrauterine gestation was found

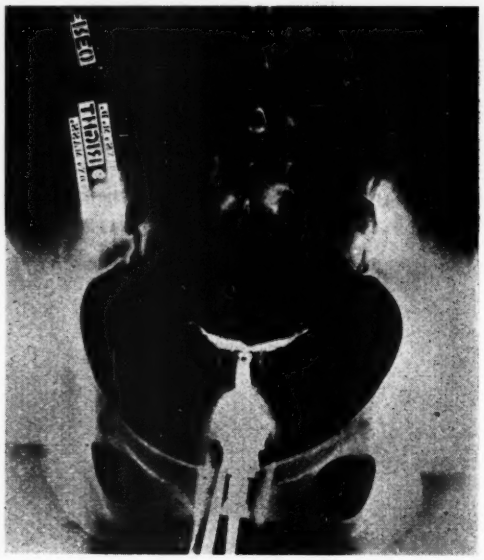

FIG. 4. Infantile uterus (tubes closed).

but the patient presented a bicornate uterus. Had this patient been studied radiographically, we are sure that operation could have been avoided.

PHYSIOLOGY

We have been able to confirm the studies of the physiological action of the uterus and tubes as observed by others.

The contractility of the uterus is easily demonstrated. When it is filled, the uterus begins to empty itself if the cannula is not firmly held in place or removed. These contractions of the uterus occur when the uterine cavity has been filled beyond its normal capacity and when it has nearly been emptied of its contents. It is also evidenced without the removal of the cannula by dial readings of the sphygmomanometer. When the maximum pressure is reached the dial

fluctuates from 160 to 140 or 150, and back to 160 again. This is repeated at intervals of 15 seconds to 5 minutes, depending upon the irritability of the uterus.

Williams and Reynolds[5], Dyroff[6], McCready and Ryan[7] and others have demonstrated that

FIG. 5. Bicornate uterus.

the uterine contractions bring about the propulsion of the contrast medium, not only out of the cervix but also out through the tubes. We also are convinced that this is true. The uterotubograms immediately after the injection of the oil show the tubes in many cases as very fine thin lines. Hardly more than a few drops of oil represent the capacity of the tubes. The roentgenogram of the uterus taken forty-five minutes later nearly always shows retention of considerable iodized oil, especially in the region of the cornu. This is more likely to be noted in flexed uteri. The tubes may still be seen as thin lines with an occasional "bead" of oil indicative of a tubal contraction. Yet within a period of twenty-four to forty-eight hours there may be considerable lipiodol scattered throughout the pelvis. The only way to account for this is the fact that the residual oil in the uterus is forced into the tubes by uterine contractions and out into the pelvis by peristaltic contractions of the

FIG. 6. Double uterus.

tubes. We have augmented this action by the intramuscular injection of pituitrin.

We have observed that the uterine cavity changes in shape particularly in the region of the cornu. This is noted at different times and is more indicative of contractions of the uterus.

FIG. 7. Fibroid uterus showing action of pituitrin.

Given the same amount of oil, injected under the same pressure, in the same patient, similar pictures should result, but the pictures vary and these variations are caused by uterine contractions. We have noted most marked variations at the premenstrual period.

We also have studied the influence of pituitrin on the uterus and are now studying the action of other drugs such as ergot, quinine, and thymophysin. We have demonstrated conclusively that after injection of pituitrin the size of the uterine cavity is markedly reduced and the activity of the contractions can be shown by manometer readings. The use of pituitrin may be of great importance in differentiating an atonic uterus from a fibroid or hyperplastic uterus since both have large capacities, the fibroid uterus being presumably less susceptible to the action of pituitrin.

Many observers have shown that the fallopian tubes have rhythmic contractions and movements. This has been demonstrated on specimens removed and placed in Locke's solution. Kennedy[8], Rubin and Bendick[9], Dyroff[10], and others have shown radiographically and fluoroscopically that the tubes go through certain characteristic peristaltic actions. These movements, according to Rubin, are of three kinds. First, a worm-like motion, due to the contraction of the longitudinal muscle fibres in the tube; second, a peristaltic movement slow and irregular, from the uterus towards the ampulla of the tube, due to the pressure with which the fluid is injected; and third, a regular peristaltic movement manifested in the form of waves from the fimbriated end of the tube towards the uterine cavity. This occurs at the rate of about five to nine times a minute.

Dyroff's experiment with contrastol is very interesting. At the time of operation he injected several drops of contrastol into a tube. Five days later he was able to demonstrate the presence of the oil in the vaginal canal.

PREGNANCY

Heuser was unsuccessful in his efforts to produce abortion in tuberculous patients by the injection of lipiodol into the uterus and this procedure gave him the opportunity to make observations of the appearance of the uterine cavity in cases of pregnancy.

There is no doubt that the diagnosis of pregnancy can be made very early by this method. We have used it in thirty-seven cases of pregnancy; sixteen patients of this group presented symptoms of intermittent bleeding and staining and the clinical diagnosis of pregnancy was doubtful, but the uterograms definitely proved pregnancy. All of this latter group of sixteen aborted and several necessitated curettage within twenty-four to forty-eight hours. One patient with pulmonary tuberculosis and pregnancy of exactly three weeks, who was deliberately injected with lipiodol with the object of terminating the pregnancy, did not abort and subsequently surgical interference was instituted. In two cases where the diagnosis of pregnancy was not suspected clinically, lipiodol injection in the uterus not only determined but in no way interfered with the progress and subsequently these two patients gave birth to normal babies. We do not recommend this method of diagnosis except in cases of threatened abortion and where the ovum has become blighted.

The pregnant uterus presents a most characteristic picture. We have always noted a "curved shelving" above the internal os. The lipiodol passes into the cervix, through the internal os, into the uterine cavity, between the outer layer of the membranes of the ovum and the uterine wall. It may even pass out through one or both tubes into the pelvic cavity. Depending upon the amount of lipiodol used, there is an upward and lateral displacement of the membranes with their contained embryo and amniotic fluid from the free wall of the uterine cavity, thus outlining an irregular, usually semilunar uterine cavity. The cervix is shortened and at the junction of this with the body of the uterus there is an abrupt widening of the cavity with the resultant "shelving". Heuser has called attention to the atonicity of pregnant uteri. We believe the atonicity is due to physiological changes in the uterine walls as well as to the definite enlargement which takes place in pregnancy.

FIG. 8. Early pregnancy. Note shelving above internal os.

PATHOLOGICAL CONDITIONS

I. The Cervix

One phase of uterotubographic studies has been overlooked or at least not stressed, and that is the study of the cervix. By use of our special adjustable cannula and aluminum-bladed speculum we have been able to get radiographs of the

FIG. 9. Pregnancy of 3 weeks.

cervical canal which have been most enlightening. With this cannula we are able to bring about complete obturation with little obscurity of the cervical canal. The aluminum-bladed speculum, an instrument which is radiographically transparent, gives us a view of the entire cervical canal without the necessity of its removal before taking the x-ray films. The technique is thus considerably simplified.

The normal cervical canal is about 4.2 centimeters in length. Its maximum width is about 0.5 centimeter. These measurements represent the averages taken from over 100 cases of those we considered to be normal. Almost invariably the level of the internal os is marked by a sphincter-like constriction, at which point (if there is no spasm) the width is reduced to about 3 mm. The external os cannot be accurately measured because of the presence of the cannula. The borders of the canal are normally smooth, regular, and approach each other, as indicated above, as they reach the level of the internal os.

By our studies, corroborated by inspection, operation and pathological findings, we were enabled to point out the following conditions:

1. Endocervicitis and cervicitis
2. Polypi
3. Relaxation or dilatation without marked endocervicitis (as seen in the infantile type)
4. Spasm
5. Abnormally long cervical canals
6. Cancer

The picture of endocervicitis is very interesting and characteristic. We have noted a marked increase in the length of the canal accompanied by a marked dilatation—in some instances as much as 2.5 centimeters in width. The borders present a peculiar feathery or striated appearance due to dilatation of the cervical glands or to ulceration of the endocervix, or both, into which the iodized oil finds its way. The striae are seen to run practically parallel to each other and at right angles to the cervical canal. In most of the cases the external os has a pin point opening. The findings of this condition, radiographically, in many cases without external evidence of endocervicitis, show the value of this simple test.

In polypi of the cervix the canal is again dilated, there may or may not be an accompanying endocervicitis as indicated by the feathery borders, and the presence of the polyp is shown

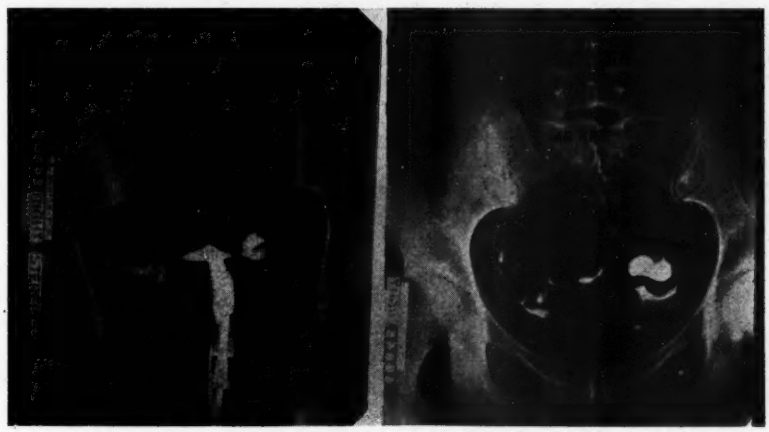

FIG. 10. Endocervicitis and retroflexed uterus.

by a definite filling defect which varies according to the size of the polyp. The importance of obturating the cervical canal with as little of the cannula as possible should be emphasized here, because, if the cannula extends too far into the canal, it may go beyond the attachment of the polyp or it may compress the polyp against the wall of the canal, and the presence of this pathological structure may be entirely missed. We have failed to note a polyp because of an error in technique on several occasions.

FIG. 11. Cervical polyp.

Carcinoma of the cervix and uterus produce characteristic pictures. Definite irregular filling defects can be seen depending on the extent of the lesion, simulating the defects seen in carcinoma of the stomach. Jarcho[11] and others warn against the use of lipiodol injections in cancer because of the danger of forcing cancer cells into the uterus, tubes and pelvic cavity. We believe that uterography is much less likely to loosen up cells than diagnostic curettings and biopsies. In fact, after curetting, vessels are widely opened. We believe that by careful injection and manipulations, under positive pressure control, the danger of transplantation seems rather remote. If this method can give us a better clue to the extent of the malignant process, as it apparently does, its use is justifiable. It is particularly useful in the follow-up after radiation therapy.

We have noted a number of instances of marked elongation of the cervical canal and, in some cases, extreme degree of spasm, so that the canal presents itself as a fine thread. We have also noted in many instances, especially in sterility cases, a definite spasm of the internal os. The presence of such a condition probably accounts for sterility in some cases.

II. The Uterus

We have often been able by means of ureterography to make a definite diagnosis which could only have been suspected, indeed in many cases overlooked, by the usual gynecological examinations. It is not meant to imply that this method is infallible and that it will supplant bimanual examinations, but should be used to corroborate suspected pathology as first determined by careful pelvic examinations.

In the uterus we have been able to show the following conditions—all proven by operation:

1. Hyperplasia or subinvolution
2. Endometritis, hyperplastic and tuberculous
3. Polypi
4. Submucous fibroids
5. Leiomyomata

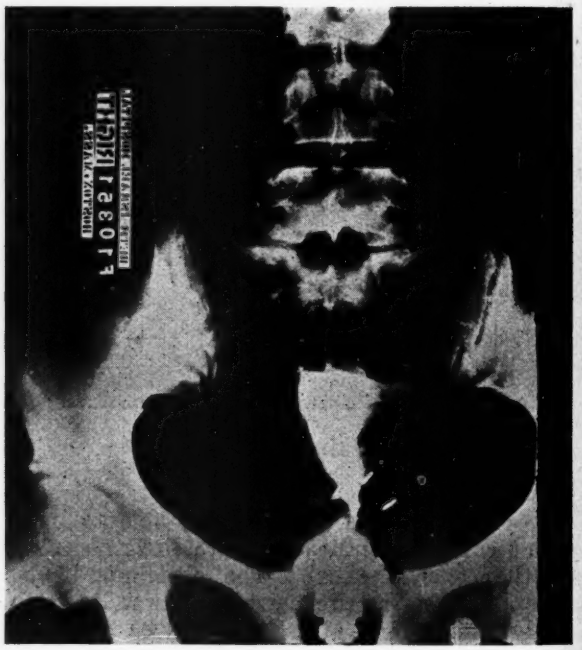

FIG. 12. Carcinoma of cervix with extension into body of the uterus. Note radium implantations.

6. Carcinoma
7. Retained products of conception
8. Blighted ovum
9. Hydatidiform mole
10. Pregnancy.

In metrorrhagia and menorrhagia this method frequently enables us to arrive at a diagnosis. Polypi and submucous fibroids are easily diagnosed by the filling defects which they cause. Hyperplastic endometritis is shown by enlargement of the uterus and by fine irregular, wavy, and hazy borders.

Cancer produces definite irregular filling defects giving a moth-eaten appearance, characteristic of cancer elsewhere.

Tuberculous endometritis presents a unique picture. We have noted small pouchlike projections, simulating penetrating ulcers of the stomach, also flattened areas of diminished density produced by healed ulcers. The contour of the uterine cavity is irregular. The cervical canal may be irregular and somewhat narrowed. The tubes are usually occluded.

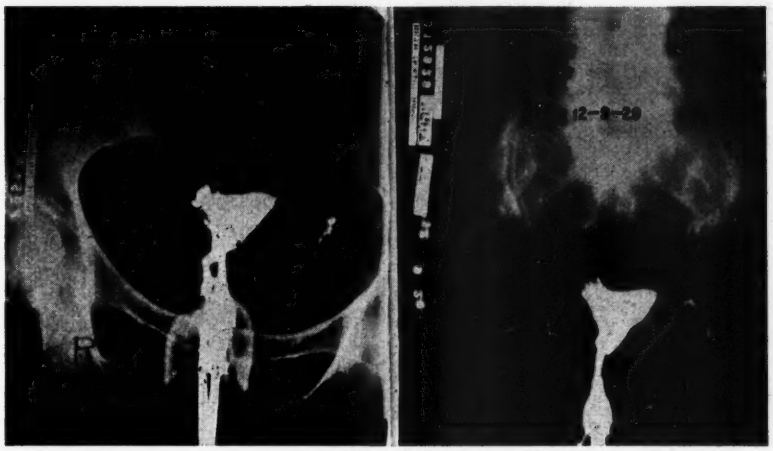

FIG. 13. Carcinoma involving fundus before and after radiation therapy.

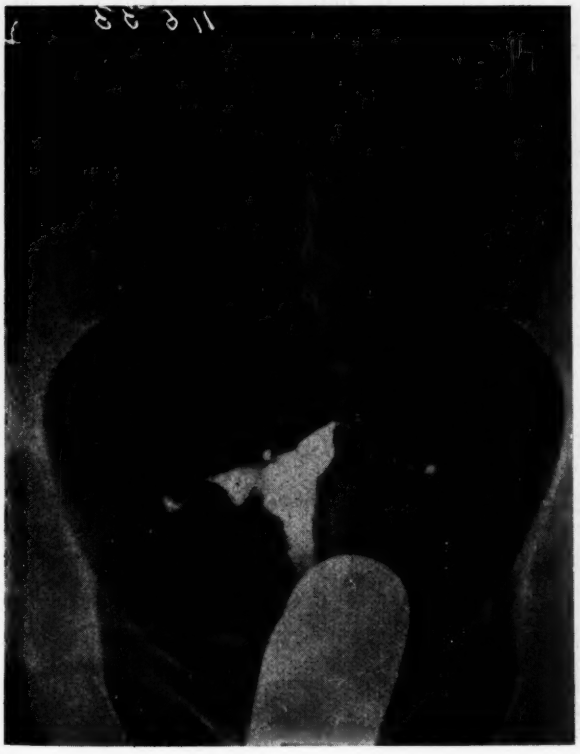

FIG. 14. Tuberculous endometritis.

Leiomyomata are revealed by a large uterine cavity, which is usually irregular according to the pressure exerted by the tumor on the uterine cavity. The outlines of the uterine cavity may be very grotesque, or only slightly deviated from the normal, especially if the fibroid is subserous and makes no impression on the uterine cavity. We have noted a peculiar rounding out or blunting of the regions of the uterine cornu in many cases. At times, especially if the region of the intramural part of the tube is involved, this part of the tube becomes markedly elongated as compared with that of the normal tube. In doubtful cases a combination of the lipiodol injection into the uterus, and a cystogram, the technique of which has been described[12], is most helpful, showing, as it does, characteristic pressure changes on the urinary bladder.

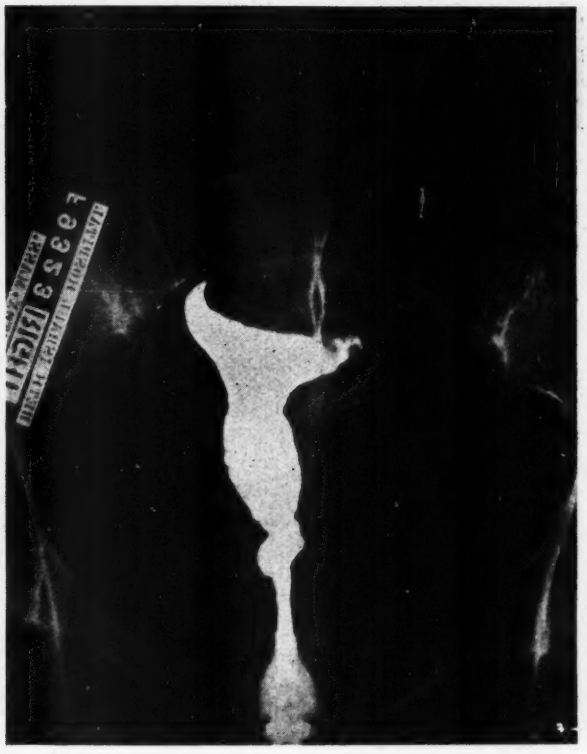

FIG. 15. Large fibroid uterus.

In hyperplasia or subinvolution the uterine cavity is large but quite regular in outline. Such

cavities can be markedly diminished in size by the intramuscular injection of pituitrin.

In retained products of conception, there is a marked enlargement of the cavity and the outline presented is most bizarre. Hydatidiform mole likewise produces a very irregular outline with circular areas here and there suggestive of the pathological condition. The picture of pregnancy we have already described.

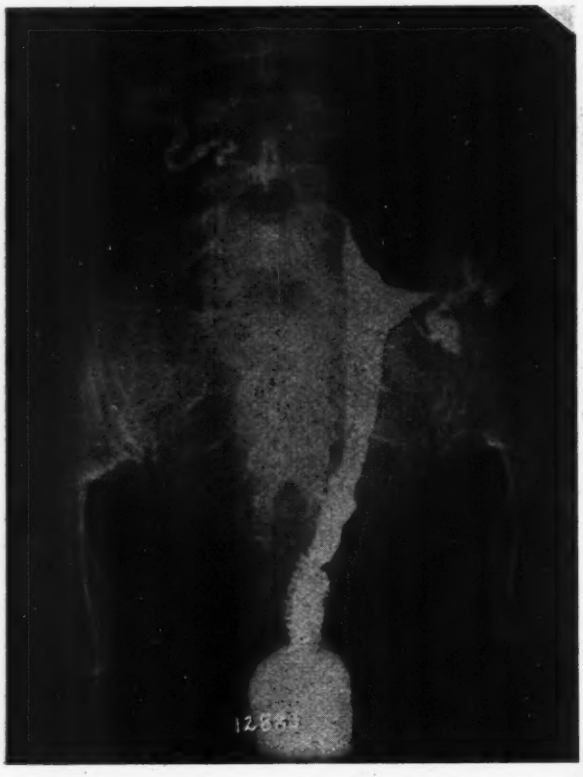

FIG. 16. Interligamentous fibroid and endocervicitis.

III. The Tubes

In diseased tubes the contractility is disturbed and peristalsis may be present, or absent. If present, it is apt to be much less active than normal. Where there is obstruction at the cornu the tube is not visualized. If the obstruction is at the fimbriated end the oil accumulates in the tube and may be seen—especially in the ampulla—for many months afterwards. We had one case where the lipiodol was still present in the tube as long as fourteen months after the instillation. In practically all of these obstructive cases, adhesions are present as indicated by the unchanging position of the original shadow. The appearance in hydrosalpinx is especially characteristic. Here the ampulla of the tube is markedly dilated and the lipiodol not only remains in the tube, but, coming in contact with the fluid in the tube, the oil is seen in the form of many globular shadows arranged in grape-like fashion. This appearance is different from that seen in the normal tube during peristalsis and which was described by Dyroff and Rubin as "beading". These pictures may be compared with the streptococcus chain and the staphylococcus group, i.e., in peristalsis the "beads" are arranged in a chain-like series while in hydrosalpinx they are arranged like a bunch of grapes.

Occasionally, in pelvic inflammation, with pelvic adhesions, peritoneal pockets communicating with patent tubes are found. These pockets may contain fluid, and when injected with lipiodol may present a picture resembling hydrosalpinx. To differentiate the two conditions, roentgenograms are taken forty-eight hours later. In the case of hydrosalpinx the oil droplets usually coalesce and form a definitely rounded or oval shadow on one side of the pelvis or the other. Some beading may still be present. In the other cases the oil droplets again have practically all coalesced but the outline of the shadow is indefinite, not being surrounded as in the hydrosalpinx by a more or less unyielding wall.

In order to prove without question whether the tubes are patent, it is important to take a check-up film forty-eight to seventy-two hours after the injection. When patent, the oil is seen to be disseminated throughout the pelvic cavity. In many cases the tubes are so patent that the oil is seen to pass through the fimbriated end immediately after the injection.

FIG. 17. Hydatidiform mole.

If no oil is seen free in the pelvic cavity, the tubes are probably closed. Due to faulty technique, the tubes, although patent, may be incompletely filled and lead one to suspect obstruction. Whenever doubtful, the test should be repeated. If oil is still present in the tubes it is usually

seen near the ampulla although it may be present as a rounded shadow or as a linear shadow at any point along the course of the tube proximal to the region of the obstruction. Such obstructions are due usually to inflammatory changes within the lumen of the tube or may be due to kinks or convolutions produced by adhesions of a perisalpingitis. There is no doubt in our minds but that we have brought about patency in many tubes which were obstructed at the fimbriated ends or kinked along their course by delicate adhesions. We shall make reference to this again in the consideration of our sterility cases.

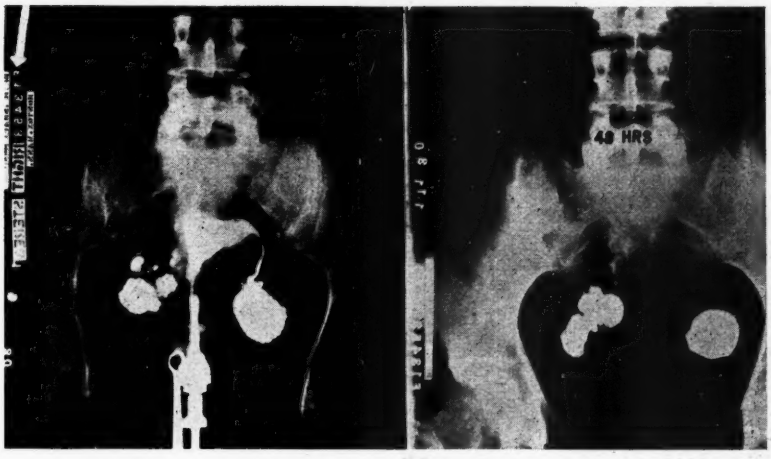

FIG. 18. Bilateral hydrosalpinx.

Tuberculosis of the tubes, especially where there has been some calcification, may be diagnosed or at least suspected by the use of lipiodol injections. In the original plain film taken routinely before tests, we look for unusual shadows such as glands, foreign bodies, and calcification due to other causes. In our cases of tuberculous salpingitis we have noted the presence of calcification about the occluded or partially occluded tube. Lipiodol partially entered the tube, the line of the patent portion ending abruptly, close to the irregular calcification. We believe, therefore, that in all cases preliminary films should be taken. In the presence of calcified glands and tubal occlusion, tuberculosis as a cause for tubal obstruction should be borne in mind.

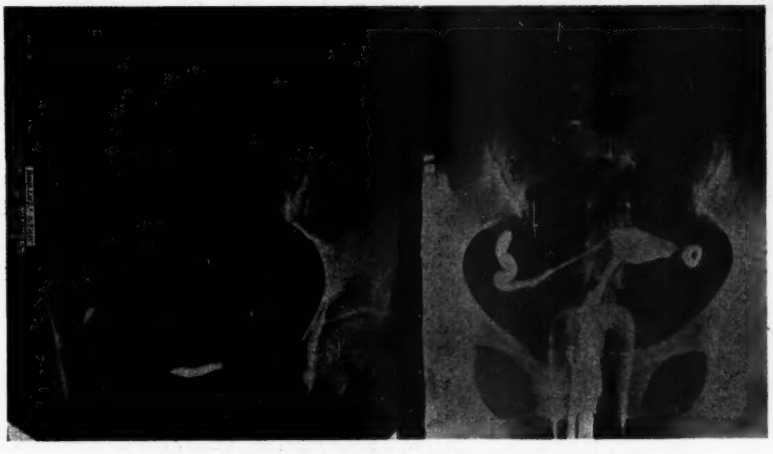

FIG. 19. Bilateral chronic salpingitis with adhesions.

The importance of the findings as regards the condition of the tubes is very evident especially in cases of sterility. We have practically given up the insufflation of the tubes which we have done in over four hundred cases because hysterosalpingography offers us so much more information, and is attended, in properly selected cases, with no harm to the patient. We have noted a number of instances where air or carbon dioxide could not pass through the tubes and in which oil showed the tubes to be patent. On repeating the Rubin test subsequently we again met with failure.

There has been a difference of opinion as to the patency of the tube during menstruation. Dyroff thinks that the tubes are open, and that tubal and uterine contractions are accelerated. Douay[13] believes that during catamenia, the mucous membrane, being hypertrophied, diminishes the patency of the tubes and may even bring about a temporary closure. We believe with Dyroff, Béclère[14], and others that the menstrual hypertrophy can readily be overcome by the

fluid injected under pressure but that the injection should be carried out during the intramenstrual period.

In 314 cases of occluded tubes we have found the occlusion in the distal portion in 82.3% and 17.7% at the isthmus. These figures vary with those quoted by Kennedy[15] who found 69.2% at the fimbriated ends and 30.8% at the isthmus determined in 18 cases of non-patency.

In cases of chronic salpingitis or chronic pelvic inflammation, when at operation the tubes have been resected, or lysis of adhesions with the freeing of the fimbriated ends of the tubes has been performed, it is well and safe to follow such operations a few days later with lipiodol injections with the hope of maintaining the patency of the tubes. We have had four cases in which obstruction at the fimbriated ends was demonstrated by roentgenograms and all of which were subjected to conservative operation. Two of these cases showed obstruction again after the operation. The other two showed obstruction of one tube and patency of the other. One of these cases became pregnant and was delivered of a normal baby. As a therapeutic measure, therefore, in such cases this procedure has a marked value.

FIG. 20. Tuberculous salpingitis and anteflexed uterus.

We have observed that in 95% of cases with infantile uteri the tubes were obstructed at the distal portion. This is probably due to atrophic changes in the tube. In children, presenting naturally infantile uteri, the tubes are patent. We have injected an autopsy specimen from a child two years of age. The capacity of the uterine cavity was 1.5 cubic centimeters. The capacity of the tubes was one-half of a cubic centimeter, and the oil could be seen passing through the fimbriated ends. The infantile uterus and tubes, therefore, seen in the adult are different from those seen in children.

EXTRAUTERINE PREGNANCY

There have been many reports on the findings in extrauterine pregnancy. Especially noteworthy are those of Schneider and Eisler[16] in a series of ten cases and of Popovic and Smokvina[17] in a series of twenty-three cases. From their observations there is absolutely no characteristic picture and errors are easily made. However, we believe that where the condition is suspected the careful injection of lipiodol can do no harm and may be of considerable value. At least intrauterine pregnancy can be ruled out and it can be shown whether there is atonicity of the uterus, or patency or obstruction of the tubes.

EXTRINSIC TUMORS

Ovarian, parovarian, and intraligamentous tumors cannot always be made out with certainty. We have been able by pelvic injection with lipiodol to demonstrate conclusively certain of these tumors—proved by operation. Approximately 33% of our cases have been operated upon so that we have had good opportunity to compare the actual pathology with the roentgenograms. It is true that in many instances the differential diagnosis in pelvic tumors cannot be made even with lipiodol injections. We have made errors in diagnosis in 10% of our cases. However, we are not discouraged because we feel that with further experience, and with perhaps some variation in technique, our errors in diagnosis may be less. We do know that with this method we have been able to make the differential diagnosis time and again, where with the ordinary pelvic examinations we have failed.

There are several observations which are indicative of extrinsic tumors. Among these are, first, the displacement of the uterus; secondly, the distortion of the uterus on the side of the tumor; thirdly, the outlining of the tumor by the oil which has leaked out of the fimbriated end of the tube; and fourthly, in the case of ovarian or intraligamentous cysts, the elongation of the tube as it lies stretched over the tumor mass. The expediency of outlining the tumor before the roentgenogram is taken, by placing a lead wire on the abdominal wall, as first suggested by Béclère, Darbois and Leboux-Lebard[18] and then studying the relation of the lipiodol picture with the shadow cast by this lead wire may be helpful in some instances in differentiating a uterine or extrauterine tumor, but it is not infallible. The combination of pneumoperitoneum with uterotubography as used by Stein and Arens[19] ought to

give better results. We have had no experience with this method and are rather reluctant to try it.

STERILITY

Our experience with sterility cases has been especially interesting and gratifying. We have done uterotubography on 330 cases of relative

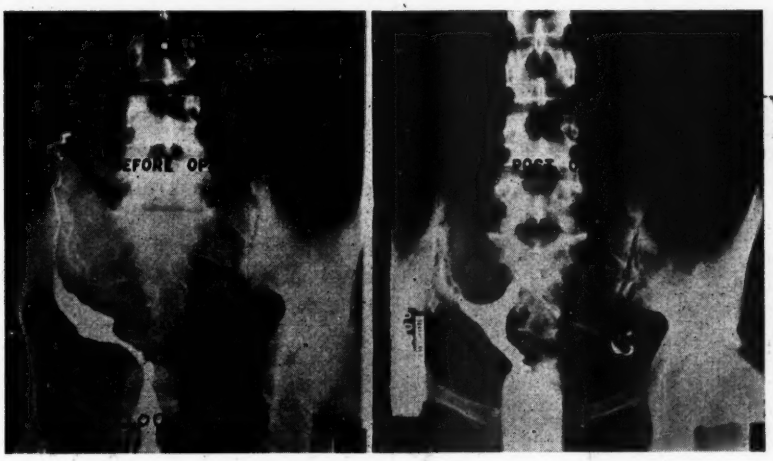

FIG. 21. Displacement of uterus by a large ovarian cyst before and after operation.

or primary sterility, and out of this number 43 have become pregnant and 39 were delivered at full term. Of these 330 cases 197 had either malformation or maldevelopment of the uterus or occlusion of the tubes. These cases naturally could not possibly become pregnant unless helped first by surgical intervention. There remain 133 cases in which one or both tubes were found to be, or caused to be patent by injection of lipiodol. Of these, 32% have become pregnant. Of course we cannot believe that there is any inherent quality in the lipiodol which has brought about these results. There are many factors which may be considered. Looking upon the problem as a whole, sterility in the female may be due to malformations, maldevelopment, or inflammation of the cervix, uterus, tubes or ovaries; to spasm at the internal os or the uterine cornu; tumors, intrinsic or extrinsic, or to partial or total occlusion of both tubes by internal or external adhesions. We believe that the injection of the oil necessarily brings about some dilatation of the cervical canal and internal os, and overcomes, in many instances spasms at the tubal sphincter and, on account of the pressure with which the instillation is made, may break up delicate adhesions which obstruct the tube along its course or at the fimbriated end. We had opportunities, in autopsy specimens where fine delicate adhesions of the tubes were present, to demonstrate conclusively that these adhesions which bound the tube down in a convoluted manner were released and that the kinks in the tubes were definitely straightened. The oil was seen to pass through the fimbriated ends. The therapeutic value, therefore, of lipiodol in these cases is real and makes us believe that it should be used in cases of sterility more often than has been done heretofore.

Of those patients who became pregnant, four miscarried, one of them twins at 4½ months; the others aborted during the third or fourth months of pregnancy.

TECHNIQUE

To one accustomed to vaginal manipulations, the intrauterine injection of lipiodol is quite simple. It is extremely important to observe

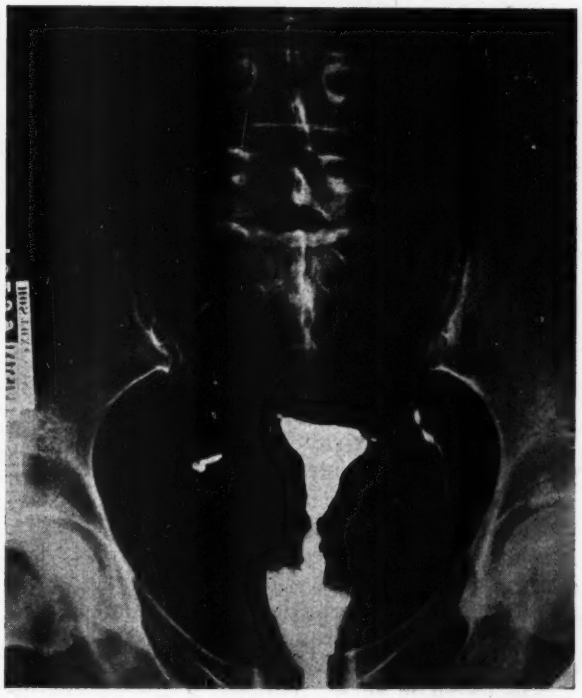

FIG. 22. Spasm of left cornual sphincter. Note normal sphincter on right.

the strictest aseptic precautions. We do not believe, as do many others, that it is necessary to hospitalize patients to carry out this test. The

majority of our cases have been ambulatory, were done in the office, or as out-patients in the hospital. This test is practically free from pain and is harmless if conducted properly. Occasionally the patient may complain of pain in the lower abdomen during the injection. This is usually due to overdistention of the uterine cavity and to uterine contractions which are excited by the presence of lipiodol. As soon as the pressure is released, allowing some of the oil to come back into the syringe, the pain disappears. The injection should be made by a gynecologist and the roentgenograms taken by a radiologist. Coöperation in the work is essential.

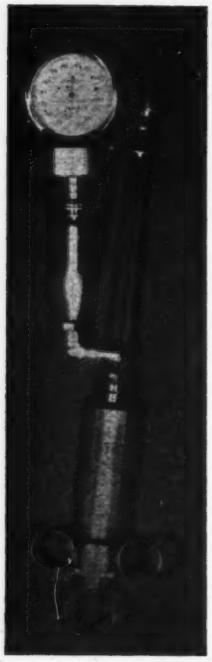

FIG. 23. Simple apparatus for injection of iodized oil under pressure control.

Having had a thoroughly complete examination before the test, the patient is asked to report for the lipiodol injection after having had an enema and a vaginal douche. Since the procedure is attended with but little pain no preliminary narcotic or anesthesia is necessary.

A preliminary x-ray film is taken. It is interesting to know how often we see calcified glands, stones in the ureter or bladder, tumor outlines, dermoid cysts, calcified fibroids, calcification in tubes, residual mercury deposits given into the buttocks for antisyphilitic treatment, and bone deformities. The patient is then placed in the lithotomy position on a table equipped with a Bucky diaphragm.

The vulva is then scrubbed, a special aluminum vaginal bivalve speculum is passed and the cervix exposed. The anterior lip of the cervix is grasped with a tenaculum. Since there is frequently a large amount of mucus acting as a plug in the cervical canal, this is removed by suction. The position of the uterus must be determined either by a preliminary bimanual examination or by passing a uterine sound. This is important and will do away with much of the difficulty frequently encountered with the injection. In small uteri, stenosed or scarred cervices, acutely anteflexed or retroflexed uteri, where there may be difficulty in getting by the internal os, it is sometimes necessary to pass a dilator before the injection.

With a special cannula and pressure apparatus attached to a syringe the oil is injected slowly with due regard to any reaction on the part of the patient and to the amount of pressure being used. Our apparatus and technique have been described more fully[20].

Stereoscopic films are taken immediately after the injection is completed. All instruments are removed, the vagina wiped clean and a sterile sponge is placed in the vagina to absorb the lipiodol which is returned from the uterine cavity. The patient is then allowed to get up. Another plate is taken forty-five minutes later, especially to determine the condition of the tubes, and the patient is asked to report within forty-eight hours to have a final film taken to observe the position of the remaining lipiodol in the pelvis or tubes.

We have worked out the average pressure curves for cases with normal uterus and tubes, with tubal obstruction, and in cases with large uterine cavities due to fibroid, pregnancy or general atonicity. See charts 1, 2 and 3.

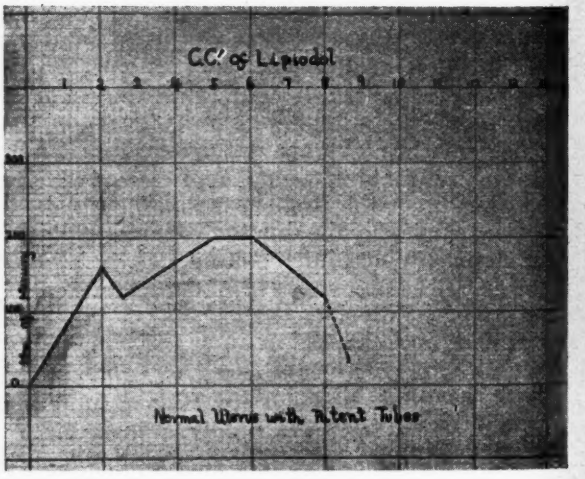

CHART 1.

In the normal uterus with patent tubes there is an initial rise of the pressure to an average of 160 millimeters of mercury. At this point the resistance of the internal os is met. When this is overcome there is a drop to 120 millimeters and then a rise to 200 millimeters. The drop represents the filling of the less resistant uterine cavity. The second and maximum rise is at the point where the iodized oil is forcing its way by

the tubal sphincters. Having overcome this resistance the pressure gradually drops as the oil passes through the tubes.

If the tubes are obstructed the maximum pressure may reach as high as 290 or more. We do not recommend a pressure higher than this for fear of rupture of the tube or damage to the uterine endometrium from overdistention.

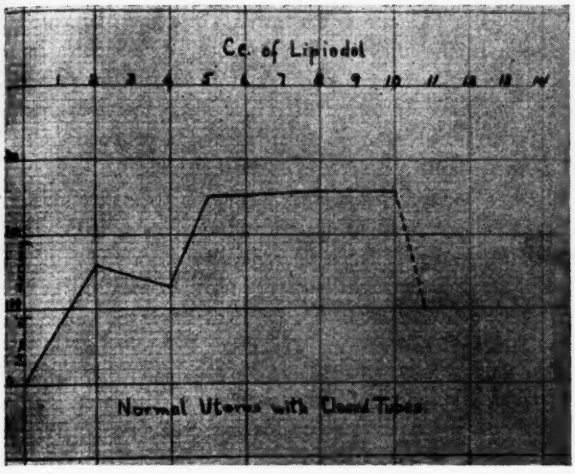

CHART 2.

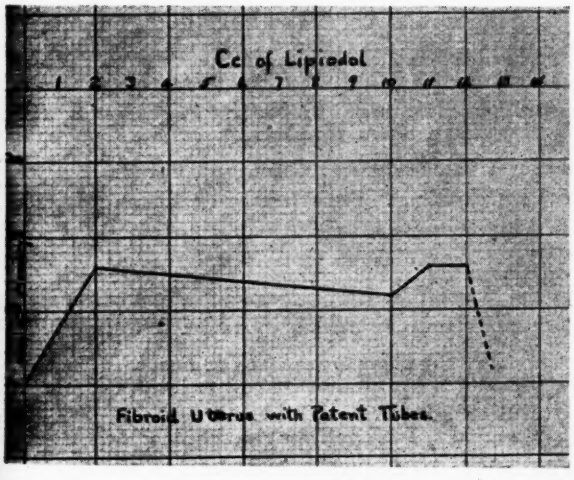

CHART 3.

In the large atonic or pregnant uterus the pressure is very low—on the average about 85 millimeters of mercury.

DANGERS

There are four possible dangers:

1. Infection of the tubes or peritoneum.
2. Rupture of the uterus or tubes.
3. Extravasation of the lipiodol through injured mucous membrane into the uterine vessels, with possibility of oil embolus.
4. Abortion.

Infections can be avoided by proper preliminary examination of the patient to rule out active discharges and by careful technique.

FIG. 24. Accidental intravascular injection of lipiodol into uterine vessels. Senile uterus injected at a pressure of 160 mm. of mercury. Patient had no ill effects.

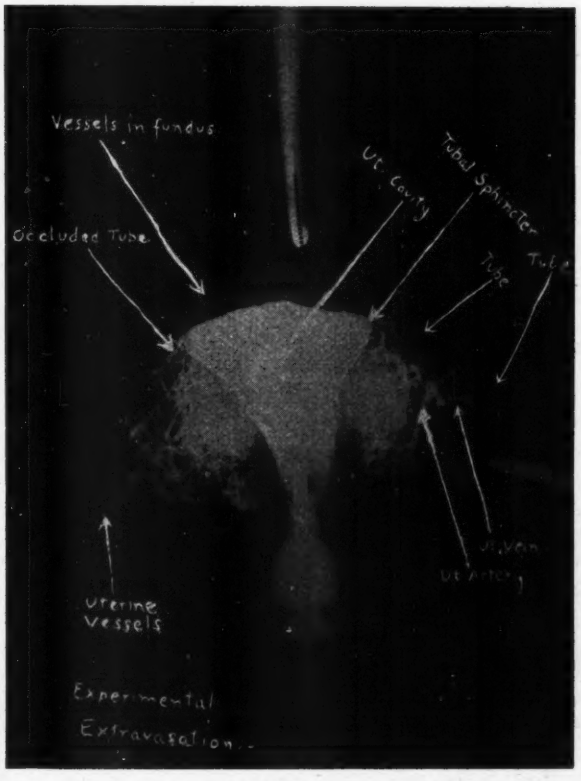

FIG. 25. Injection of lipiodol at a pressure of 300 mm. of mercury shortly after hysterectomy in a previously curetted uterus, showing intravasation.

Rupture of the uterus or tubes can be avoided by proper use of the pressure gauge. It is important to remember that in senile uteri, even if fairly normal in size, the atrophied endometrium may be injured at a pressure of 140 millimeters of mercury.

Even miscarriage can be prevented if the injection is carefully made. We do not, however, advocate its use in known cases of pregnancy.

We have noted extravasation of the lipiodol into the uterine musculature and intravascular injection in eighteen cases. In none of these was there any pain or reaction. There is especial danger of extravasation if lipiodol is injected into a recently curetted uterus. In order to study the effect of lipiodol in the bloodstream we injected 1½ to 2 cubic centimeters intravenously into rabbits. We noted no emboli and the rabbits were apparently unaffected. A study of the blood of these animals showed a leucocytosis. The following chart gives a graphic idea of this study:

We had one case of rupture of the uterus which went through the endometrium and part way through the musculature with no resulting harm. The lesson we learned from this case is that in senile uteri the endometrium is thin and friable and can easily be damaged. The pressure, therefore, in senile uteri should be low and never exceed 140 millimeters of mercury.

We had one case of urticaria which occurred two weeks after the injection and was probably due to a large amount of lipiodol in the peritoneal cavity.

Lastly, two of our patients had convulsions shortly after the injection and after recovery we found that they were epileptics.

We are quite convinced after all these experiences that lipiodol does not harm the normal membranes of the uterus or tubes and does not set up any peritoneal irritation. This we have demonstrated repeatedly by laparotomy after the injections. We have also the evidence

CHART ON LEUCOCYTOSIS IN RABBITS

RABBIT *c* LIPIODOL INTRAVENOUSLY—7/9/29

	W.B.C.	Polymorph's.	Immature	Lymphocytes	Large	Mono's.	Pseudo Platelets	Eosinophiles
7/9/29—9.30 A. M. Before Lipiodol	9,600	24.5	0	55.5	3.5	2	12	1
9.45 A. M. Lipiodol 1 cc.								
10.45 A. M.	11,200	46	0	45.0	0	2	7	
11.55 A. M.	15,800	73	0	18.5	0	0.5	7.5	0.5
7/10/29—12.15 P. M.	12,000	17	0	75	1	3.5	4.0	0.5
1 Phagocytic Monocyte seen *c* R.B.C. inclusion								
7/11/29—11.30 A. M.	12,400	33.5	0	44.5	0	14	3	0

CHART 4.

We did white counts on a series of patients before and after injection of lipiodol and found no elevation after the procedure except in two cases in both of which we were able to demonstrate extravasation. It would seem, therefore, that aside from causing a leucocytosis, extravasation, so far as we have observed, causes no other reaction. There was no rise in temperature.

In order to see just what happens in extravasation we have studied postmortem specimens which have been injected under high pressure. We have demonstrated microscopically that the pressure of the injection ruptured the endometrium and the oil was forced through the uterine muscle fibers and directly into the blood vessels.

In our entire series of 1000 cases we had one large hydrosalpinx tube rupture. This occurred before we perfected our pressure apparatus. It is interesting to note that this patient was operated on, recovered, and subsequently became pregnant and was delivered at term.

of a large number of patients who have become pregnant after the test.

CONTRAINDICATIONS

Uterotubography is contraindicated in frank infections of any part of the genital tract, in hemorrhage, in known pregnancy, and in the presence of high fever from any cause.

ABSORPTION OF LIPIODOL

Lipiodol may be absorbed quite rapidly from the peritoneal cavity—usually within a few weeks. From obstructed tubes, or in pockets caused by peritoneal adhesions the absorption may be very slow. We have seen lipiodol in the peritoneal cavity or in a dilated tube as long as six, eight and even fourteen months after the injection.

We have had occasion to examine pathological tubes removed at operation, and, by a special staining method, our pathologist, Dr. Schlesinger, has shown how the lipiodol is taken up by phagocytes of endothelial origin.

CONCLUSIONS

1. Uterotubography has widened the scope of gynecological diagnosis.
2. The procedure is comparatively simple and with proper precaution in the technique it is safe, resulting in no ill effects to the patient.
3. By it can be demonstrated the size, shape and position of the uterus, the condition of the cervix, internal os, and tubal sphincter, and the size, shape and position and condition of the tubes.
4. One is able as a result of the information obtained to treat either medically, surgically or radiologically the condition at hand with more intelligence.
5. It is of therapeutic value in cases of sterility which are due to spasm at the internal os, isthmic portion of the tube or to partial obstruction due to delicate adhesions.
6. Intrinsic tumors such as polypi of the uterine and cervical canals, submucous fibroids, even intramural fibroids which impinge upon the uterine canal can be demonstrated with a high degree of certainty.
7. Extrinsic tumors such as subserous fibromata, ovarian tumors or tubo-ovarian masses can also be demonstrated but with less certainty.
8. The procedure is valuable in metrorrhagias to differentiate cancer of the fundus, submucous polypi or fibroids, retained secundines or extrauterine pregnancy.
9. Positive pressure control should be exercised to avoid injury to the uterus or tubes and extravasation of lipiodol into uterine vessels with its latent possibility of oil embolus.

We wish to express our gratitude to Dr. M. J. Schlesinger, our pathologist, for his valuable assistance; to Dr. William Dameshek for his aid in the blood studies in connection with this work; and to the surgical and gynecological staffs for their interest and coöperation.

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CHAIRMAN RING: The next paper is entitled "Roentgen Examination for Peptic Ulcer", by Dr. Richard Dresser of Chestnut Hill.

THE ROENTGEN EXAMINATION FOR PEPTIC ULCER*

With Special Reference to Those Cases Presenting Unusual Difficulties in Diagnosis

BY RICHARD DRESSER, M.D.†

A VERY careful study of the distribution of gastric and duodenal ulcers has been recently made by Hans Lehmann. The author personally examined the stomach and duodenum of one thousand autopsied cases with a view to determining the frequency and location of peptic ulcer and the scars produced by peptic ulcer. The statistics which he has compiled are somewhat at variance with those of other observers (Hart, Musa, Holzweissig, Gruber). The fact, however, that Lehmann carried out a personal examination on all the pathological material, while the other observers collected their data from autopsy protocols, makes Lehmann's work of much greater value.

Of the 1,000 cases, 396 were men and 604 were women. Positive findings, that is ulcers or the scars of ulcers, were noted in 202 cases

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(20.2%). Grouped according to gender, 34+% of the positive cases were men and 65+% were women. The stomach was involved 2½ times as frequently as the duodenum while combined gastric and duodenal lesions were observed in 8% of the positive cases.

DISTRIBUTION OF LESIONS IN THE STOMACH

In the stomach the relationship of the scars of healed ulcers to active ulcerations was 9:1. Active ulceration occurred three times as often in men as in women while the proportion of scars was approximately the same in the two genders. The number of active ulcerations increased as the pylorus was approached, while by far the greatest number of scars were located toward the cardiac end of the stomach. This observation should be of great value in making a prognosis in a case of gastric ulcer. Those ulcers which are closer to the cardia have a tendency to heal spontaneously while ulcers nearer the pylorus show much less tendency to heal spontaneously.

Seventy-one per cent. of active ulcers were observed in the region of the lesser curvature of the stomach, twenty-two per cent. were on the posterior wall and only seven per cent. on the anterior wall. In not a single instance was a benign ulcer observed on the greater curvature.

DISTRIBUTION OF DUODENAL LESIONS

The greatest number of duodenal lesions lay close to the pylorus on the posterior wall and the lesser curvature where there was a tendency toward spontaneous healing, the proportion of scars to ulcers being approximately 3:1. Ulcers on the anterior wall appeared less likely to heal spontaneously and more prone to perforation. Ulcerations in the duodenum occurred with equal frequency in the two sexes. In the duodenum as well as the stomach there was an increase in the frequency of ulceration with an increase in age, although the duodenum was relatively more frequently involved in young individuals than was the stomach.

ROENTGEN DIAGNOSIS

The roentgen examination offers by far the most accurate and reliable method for the diagnosis of peptic ulcer. The examination should not, however, be regarded as infallible. The percentage of correct diagnoses will increase with the skill and experience of the roentgenologist and the care with which he carries out the examination. There are five cardinal points upon which the roentgen diagnosis of ulcer is based.

1. The demonstration of the ulcer crater, or niche as it has been termed by Haudek.
2. Deformities produced by scar tissue.
3. Deformities produced by spasm.
4. Disordered motility.
5. Disordered peristalsis.

GASTRIC ULCER

In the diagnosis of gastric ulcer we must depend largely on the visualization of the barium-filled crater of the ulcer. Spastic and scar tissue deformities together with delayed gastric motility and disordered peristalsis are contributory factors, but these alone will rarely warrant a positive diagnosis. Fortunately for the roentgenologist about two-thirds of the gastric ulcerations occur on the lesser curvature. Lesions in this position are readily demonstrated on films or may be visualized on the fluoroscopic screen. Those ulcers, however, which are situated on the anterior or posterior gastric walls present much greater difficulties in diagnosis. It is in the detection of these lesions that the fluoroscopic examination is indispensable. The technique of the examination is important. It is our practice to have the patient report to the roentgen department between the hours of nine and ten in the morning. Breakfast should be omitted. The patient is placed behind the fluoroscopic screen and a fairly thin mixture of barium sulphate, water, and some carbohydrate such as malted milk is given by mouth. The patient is directed to take one swallow of this mixture while the roentgenologist focuses the rays on the cardiac end of the stomach. As the barium enters the stomach it is held back with the gloved hand and allowed to trickle gradually toward the pylorus, thus clearly outlining the gastric rugae. It is thus possible to observe distortion of the rugae produced by scarring, and occasionally the pocket of a posterior wall ulcer will become evident at this part of the examination, although no longer demonstrable when the stomach is completely filled with barium.

After the stomach has been well filled with the barium mixture, the fluoroscopic examination is continued in both the upright and the prone positions. Films of the stomach are made directly after the fluoroscopic examination and the patient is then allowed to eat a light breakfast, but is directed to omit luncheon. He reports to the roentgen department six hours after the first examination, at which time he is again fluoroscoped. Additional films including the entire abdomen are taken. If there is a residue of barium in the stomach, or if anything suspicious was noted in the first examination a second barium drink is given, and the stomach and duodenum carefully reëxamined. A third examination is made at the end of twenty-four hours when indicated.

Case No. 1. A man of thirty-six, without previous gastric symptoms, suddenly vomited a large quantity of blood. He was immediately put to bed and given an ulcer diet. The bleeding promptly ceased. At no time was there any epigastric distress. About two weeks later the patient was referred for roentgen examination. On the first swallow of barium a small pocket high on the posterior wall was seen to fill (Fig. 1). This ulcer crater remained filled through-

out the fluoroscopic examination and could be demonstrated on films. If, however, the lesion had been situated a little lower or the patient had been given a few more swallows of barium, the ulcer would probably have been entirely obscured on the films. In view of Lehmann's work a good prognosis was given in this case. It has now been about four

FIG. 1. Small ulcer crater high up on posterior gastric wall. Lesions in this area have a tendency to heal spontaneously and should be given a better prognosis than those nearer the pylorus.

months since the gastric examination was carried out. There has been no further bleeding, and no other gastric symptoms.

In a recent communication Sproull reported the case of an ulcer on the greater curvature of

FIG. 2. Malignant ulceration on the greater curvature of the stomach, erroneously diagnosed as benign ulcer. (Courtesy of Dr. Sproull.)

the stomach which was erroneously diagnosed as benign by a roentgenologist, two surgeons and one pathologist (Fig. 2). This ulceration eventually proved to be malignant. In a review of the literature Sproull finds no authentic cases of benign ulcer of the greater curvature of the stomach and concludes that: "It is probably unwise for a roentgenologist to diagnose a lesion on the greater curvature as benign peptic ulcer. The chance of the diagnosis being correct is very small, probably one in a million, and making such a diagnosis connotes a benign lesion and may influence an uninformed practitioner to adopt medical treatment for a lesion which should be treated surgically." Sproull's observations are entirely in accord with the pathologic findings of Lehmann who is very emphatic in stating that benign ulcers do not occur on the greater gastric curvature.

DUODENAL ULCER

The roentgen diagnosis of duodenal ulcer is made three or four times as frequently as that of gastric ulcer. In reviewing Lehmann's figures one notes that a larger number of active ulcerations were found in the duodenum than in the stomach, although the scars of healed ulcers were far more numerous in the stomach than in the duodenum. It seems probable that lesions in the duodenum can be more readily diagnosed by roentgen examination than those in the stomach, which would account for the discrepancy between the pathological and roentgen findings.

Since the work of Gregory Cole we have come to rely on the deformity of the first portion of the duodenum as being the most reliable sign of ulcer in this region. If this deformity is due to cicatricial tissue it will remain constant. If, however, it is due largely to spasm, which is often the case, the deformity may be absent at times. We then must rely for our diagnosis on the demonstration of the ulcer crater or we must reëxamine the patient in the hope that the spastic deformity will be present at the next observation.

CASE No. 2. A man, aged thirty-two, gave the history of attacks of epigastric pain, extending over a period of nearly ten years. There had been no vomiting and the patient had never noticed blood in the stools. The pain came on two or three hours after meals and was relieved by taking a small amount of food. Baking soda also gave some relief. Roentgen examination showed the gastric contour to be normal. Gastric peristalsis was of the deep hyperactive type. The first portion of the duodenum emptied rapidly, but occasionally could be filled showing a perfectly normal outline (Fig. 3A). Examination made six hours after ingestion of the barium meal showed the stomach to be entirely empty. The patient gave such a characteristic story of duodenal ulcer that he was asked to return in a month or two for reëxamination, particularly at a time when he was having severe pain. At the second examination there was a very characteristic deformity of the first portion of the duodenum and a positive diagnosis of duodenal ulcer was made (Fig. 3B).

This case illustrates a spastic condition of the duodenum produced by ulcer, which was not

constant. It also shows the value of repeating the gastro-intestinal examination in a suspicious case.

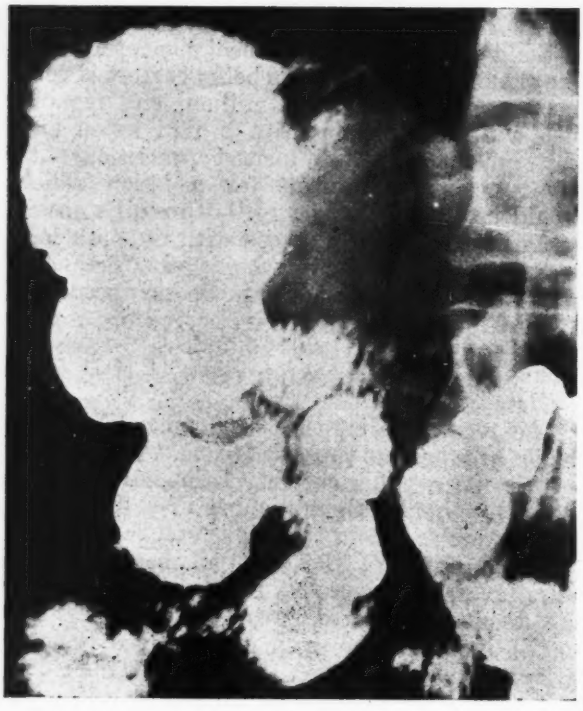

FIG. 3A. A case of duodenal ulcer presenting perfectly normal findings at the first examination, with the exception of hyperperistalsis.

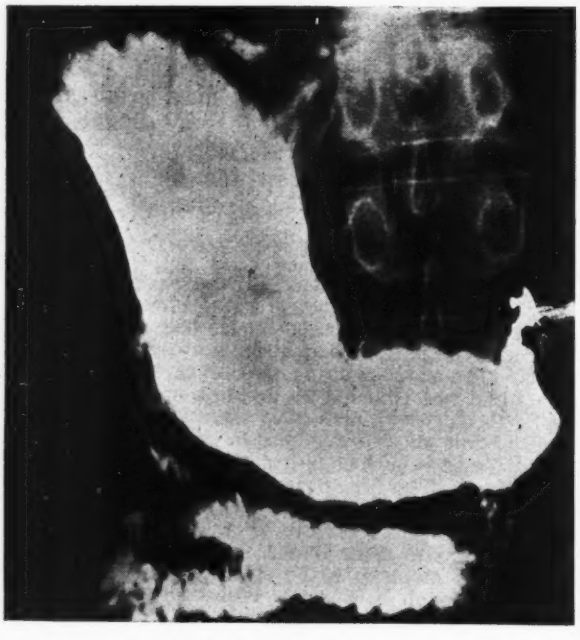

FIG. 3B. The same case as Fig. 3A showing a typical deformity of the duodenal bulb two months later.

CASE No. 3. Male, aged thirty-five. About six years ago the patient developed epigastric pain coming on four hours after meals, and relieved by eating. Two weeks after the onset of these symptoms he had a severe hemorrhage and passed a large quantity of blood by rectum. He was in bed on a fluid diet for a week, and continued on a light diet for six months. He had no further trouble for about five years, when the symptoms of epigastric pain returned. The patient was again put on a diet, and the symptoms were relieved until three weeks previous to his roentgen examination, at which time the distress returned and was almost constant. Roentgen examination of the gastro-intestinal tract showed the esophagus to be normal. The stomach was in the usual position. Gastric peristalsis was moderately active. The gastric contour was normal. The first portion of the duodenum was perfectly normal in contour (Fig. 4).

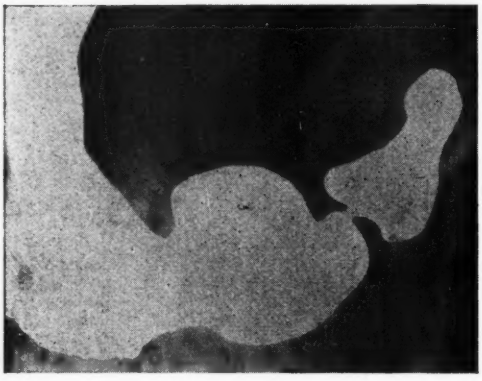

FIG. 4. A case of "fleck" ulcer of the duodenum presenting a normal contour of the bulb. The lesion could not be demonstrated on the film, but the diagnosis was easily made fluoroscopically.

However, on palpation under fluoroscopic observation a small ulcer crater could be demonstrated directly in the center of the duodenal bulb. As soon as the pressure was removed the crater was no longer visible. At the end of six hours the stomach contained a small barium residue.

This type of duodenal ulcer is fairly common, and is sometimes termed a "fleck" ulcer. There is at no time a deformity in the contour of the duodenal bulb, and one must rely entirely for a diagnosis on the demonstration of the ulcer crater. This can usually be done only under fluoroscopic observation, and the lesion may be entirely overlooked if films alone are relied upon.

Ulcers of the descending or second portion of the duodenum occur infrequently. None was found in Lehmann's material. This portion of the duodenum, however, should not be disregarded in the roentgen examination for in rare instances an ulcer in this location can be demonstrated.

CASE No. 4. A woman, aged fifty-three, was admitted to the Massachusetts General Hospital with the complaint of pain in the right upper quadrant and back, of eight years' duration. The pain was present in periods of from one to three months, with intervals between of absolute freedom. The distress came on one to two hours after eating, and was relieved by a little food or soda. It frequently appeared at night, awakening the patient from sleep. No nausea or vomiting. Chronic constipation. No loss of weight. History otherwise negative.

Examination of the gall bladder by the Graham-Cole Method:—The shadow of the gall bladder is faintly visible after taking the dye. It does not appear abnormal. The shadow diminishes in size after the ingestion of food.

Examination of the gastro-intestinal tract by

barium meal:—The stomach is low in position. It is empty after six hours. The first portion of the duodenum appears normal in contour. Just beyond the first portion there is a small "fleck" of barium which persists throughout the fluoroscopic examination. At twenty-four hours the head of the barium column is in the rectum. The examination should be repeated without a motor meal.

Second examination of the gastro-intestinal tract:—Reëxamination confirms the previous observation. The first portion of the duodenum is normal. There is a slight narrowing of the second part of the duodenum with a persistent small "fleck" of barium (ulcer crater) in this area. Although ulcers of this region are of infrequent occurrence, I believe this is an ulcer of the second portion of the duodenum.

Report of exploratory laparotomy:—There was definite induration over an area of about three centimeters of the descending, or second portion of the duodenum. The exact relationship of this induration to the ampulla could not be determined, but it was thought that the induration was just above it. There was stippling over the anterior wall of the duodenum at this point. A posterior gastroenterostomy was done.

Following the operation the patient developed symptoms of intestinal obstruction.

Second operation:—Moderately heavy adhesions were freed down to the old anastomosis. It was found that the jejunum, about three inches beyond the anastomosis, was constricted and kinked by adhesions. When these were freed the jejunum filled. An enterostomy was then made between the loops, just proximal and just distal to the anastomosis.

The patient made an uneventful recovery and was discharged free from symptoms.

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Discussion

Chairman Ring: These two papers are now open for discussion, the one by Dr. Robins and Dr. Shapira on "The Value of Hysterosalpingography", and the other by Dr. Dresser on "Roentgen Examination for Peptic Ulcer." Surely there is material enough here for some discussion. Dr. McClure, can't you say something to us about this last paper?

Dr. McClure: I would like to express my interest in these papers. I must say that the paper given by Dr. Robins was presented most admirably. It is a subject of which I know very little.

The second paper, being in my particular field, is a matter of great interest to me. I am particularly pleased to note the use of the fluoroscope. Some years ago I proposed that the fluoroscope was a very valuable asset in the radiographic examination of the stomach and the intestinal tract, and I was very severely taken to task. Had it not been for the encouragement of that most skilful radiographer and very philosophical, constructive humorist and teacher, Dr. Ellsworth, I think I would have been afraid to say anything more about the fluoroscope. The lecturer has pointed out very concisely its great value.

The lecturer, Dr. Dresser, also stated that one should be very cautious in making diagnoses of benign ulcer on the crater curvature of the stomach. The x-ray man should be careful about making a diagnosis of any benign lesion in the stomach, no matter how characteristic the lesion is from the x-ray standpoint, as it may not be an ulcer. No matter how characteristic the history, the lesion may not be a benign ulcer. We can determine by two procedures only, first by operation, which I do not advocate for every patient, and secondly by observing the action of treatment on the patient not merely for a period of a few weeks. I do not feel that a lesion in the stomach is benign until a patient has recovered his weight and strength and remains well for at least a year.

Following Dr. McClure's remarks at 12:00 Noon the Section of Radiology and Physiotherapy adjourned.

AGRANULOCYTOSIS

Report of Four Cases

BY B. HARRISON RAGLE, M.D.,* F. DENNETTE ADAMS, M.D.,* AND JOHN HOWARD FAY, M.D.*

SCHULTZ[1] in 1922 reported five cases under the heading "Gangrenous Processes and Injury of the Granulocytic System". These cases all had gangrenous and ulcerative stomatitis, gingivitis, tonsillitis, pharyngitis and laryngitis in various combinations. There was absence or great diminution of granulocytes in the circulating blood. The highest white count was 1,800. At autopsy the only finding of note was the great diminution of granulocytes and myelocytes in the bone marrow. Death occurred in from three days to two weeks. Schultz concluded that far-reaching lesions of the bone marrow occurred which resulted in a catastrophic loss of tissue resistance. He was not the first to describe this condition but he christened it "Agranulocytosis" and appears to be responsible for the present interest in the condition.

Since 1922 there has been a steady stream of reported cases in the literature. Some of these have conformed to the original description while others have had only the agranulocytosis combined with a wide variety of clinical and laboratory findings.

Agranulocytosis we understand to mean absence or great diminution of granulocytes in the circulating blood while the other blood elements are present in relatively normal proportions. It is not surprising that such a clear cut and easily observed finding should have raised a cloud of etiologic theory, and such has been the case. A variety of etiologic agents, bacterial and chemical, have been held responsible. It now seems that agranulocytosis occurring from any cause, far from being in any sense a specific entity, is no more than a sign, and a very grave prognostic sign.

Roberts and Kracke[2] give an excellent summary of existing knowledge of this finding together with a very comprehensive tentative classification of the conditions in which it occurs. In their "Comment" they say, "Throughout the discussions, references are made to aplastic anemia, which of course affords an example of a recognized disease of the blood with aplasia of the marrow and a varying decrease in the erythrocytes, polymorphonuclears and platelets. A more acute and selective aplasia with elimination, or near elimination, of the myelocyte group and activity is apparently present in true agranulocytosis." They point out that in the disease entity agranulocytic angina there are three onsets: bone marrow, blood stream and clinical, in the order named. A very beautifully worked-up case is reported in which a patient is followed through recovery from a first attack to relapse and ultimate death; very full blood and bacteriologic reports are included.

Reznikoff[3] strikes a more hopeful note in a later article "Nucleotide Therapy in Agranulocytosis," in which adenine sulphate was used intravenously with apparently striking benefit.

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CASE REPORTS

The four cases here presented have been observed by us in the course of the past sixteen months. These cases have only two points in common:

1. At one period in the course of their several illnesses they all showed the picture of agranulocytosis in the circulating blood.
2. After the original observation of agranulocytosis, death occurred at intervals varying from twelve hours to six months.

CASE ONE

L. M. S., an American housewife of 45 years, was admitted to the Emergency Ward of the Massachusetts General Hospital in August, 1929.

About eighteen days before entry she had a shaking chill lasting twenty to thirty minutes. She complained of no pain of any sort at this time and for the next ten days she was up and about. During this period her temperature was not taken, nor was any doctor consulted.

Eight days ago she returned from a tiring day and went to bed feeling "poorly" in a vague way. She awoke early the next morning with a severe chill lasting half an hour, followed by sweating and weakness; at this time she first complained of a sore throat.

For the next three days she remained in bed on the advice of her physician. During this period she ran a septic temperature of from 101° to 103° with an evening rise, and also had one or two chills every day lasting from ten to twenty-five minutes. Her appetite was very poor, which was the reason for her not eating rather than the persistent sore throat. She vomited fluids from time to time. There was a little rheumatism, not localized to any joint, nor were there any signs of inflammation. Her urine was scanty and high colored.

Four days prior to her entry jaundice appeared and she complained of high abdominal distress; her loss of appetite was more marked and weight loss was evident to her husband. She continued to vomit once or twice daily and "even water tasted badly to her". The septic fever and sore throat continued; however, she remained in good spirits, wanting to see her friends, till the night before admission when she drifted off to sleep. On the morning of admission she was semi-comatose, rousing only to questions.

Physical examination showed a well-developed and nourished, deeply jaundiced, moribund woman lying flat in bed. She was comatose but easily roused and not irrational. Her breathing was Cheyne-Stokes. Her mouth was very dry with marked sordes. The fauces and posterior pharynx were red and edematous and there was an ulcer of the left tonsil. Her sclerae were muddy yellow and there were a few small cervical glands. The heart sounds were very

faint, her pulse 120 and blood pressure 65/30. She had hypostatic râles in both axillae and there was diffuse tenderness over the right half of the abdomen on deep pressure. Her condition was so poor that it did not warrant complete examination.

Her course in the hospital was steadily downward. Her temperature was 103.2° (R) on admission and rose to 105.5° (R) terminally; her pulse rose from 120 to 150; her respirations varied from 30 to 35 and her blood pressure dropped from 65/35 to 60/40. On admission her white count was 300 (average of four counts), the smear showing slight achromia. Rare platelets and only seven small lymphocytes and no granulocytes were seen in the whole smear.

She became rapidly more comatose and five hours after admission she did not respond to questions. Her respirations became more completely Cheyne-Stokes in type. Eight hours after admission a transfusion of 600 c.c. was given without appreciable change in her general condition. Immediately following transfusion her white count was 350. She died twelve hours after admission. No autopsy was obtained.

Case Two

J. L., a single American broker of 49 years was first seen early in February 1930. At this time he complained chiefly of steadily increasing weakness for the past year. In addition he had noticed that his abdomen was steadily increasing in diameter so that he had had to give up wearing a belt on January 1.

There was a marked alcoholic history of twenty years' duration.

Physical examination at this time showed a sick, slightly icteric man. He had dark skin and definite brownish pigmentation of his face and knees, but none in his axillae or groins. He had many false teeth and some dental sepsis. He had no glandular enlargement. His heart and lungs were essentially negative except for a few bronchial squeaks and râles.

On abdominal examination his liver was found to be huge, extending to below the crest of the ilium and to the left nipple line. There was possibly a small amount of fluid in the abdomen at that time but it was impossible to obtain a fluid wave on account of the huge liver.

When he was next seen a month later there was massive edema of both lower legs and an extreme ascites. After careful study at this time a diagnosis of hemachromatosis, with a question of cirrhosis was made. It was decided to start giving salyrgan to determine whether it would be effective in controlling his ascites and edema. One-half c.c. was given intravenously and a marked diuresis obtained. Subsequently the ascites and edema were controlled by 1.0 or 1.5 c.c. administered twice weekly over a period of seven weeks. Salyrgan at no time upset the patient until April 29 when a record diuresis was obtained, but loss of appetite and unusual weakness followed for twenty-four hours. The next two days were uneventful but on May 2 after the next dose of salyrgan he experienced great prostration, various grippy aches and pains and in the evening had a temperature of 102°. On the morning following the injection a white count of 1,800 was obtained and no granulocytes were seen in a smear taken at this time. On the morning of May 4 the white count was 400, with no visible granulocytes. During the afternoon of this day, May 4, a record low white count of 100 was obtained; at this time he had a temperature of 102.6°.

There had been some dental sepsis throughout his illness and examination at this time showed a very marked ulcerative stomatitis with spongy gums and leukoplakia. His white count, which reached bottom on the afternoon of May 4, rose: May 5, to 600; May 6, to 1200; May 7, to 2100; May 9, to 2000; May 12, to 4800; and on May 16, to 6400. There were no granulocytes seen till the 6th when there were rare myelocytes, which increased steadily till on the 14th there were 80% neutrophiles.

On May 10 a tooth fell out and on the 12th the socket started bleeding. On the 14th the socket bled so profusely that he was transfused with temporary improvement. From then on he followed a steadily downward course with much oozing from the gums and vomiting of digested blood. This blood was probably in part from varices, although this was not certain till just before death on May 21 when blood could be seen welling up into his throat; this appeared to be the immediate cause of death.

No autopsy was obtained.

It was felt that this case was of especial interest for the reason that mercury was probably the etiologic agent. We have seen no cases reported as due to mercury, yet mercury is one of the foremost agents in producing stomatitis. Here there appeared to be a very powerful argument for the contention of Roberts and Kracke, that in the disease entity agranulocytic angina the bone marrow lesion is the primary one and the local oral and pharyngeal sepsis a secondary event.

In this case the connection between the clinical condition, the intravenous injections and the blood findings seems far too close to be coincidence. Also the spontaneous recovery from the agranulocytosis after stopping the salyrgan is strongly confirmatory.

Case Three

M. M. S., a married American housewife of 47 years. Eight months ago, when in New Orleans, she had general malaise, profuse sweating and fever up to 100°. Her cervical glands were swollen and tender. Her appetite was fair and there was no stomatitis or gastrointestinal upset. In two weeks she was up and about and a few days later she suddenly developed a sore mouth with some bleeding from the gums. A supposed abscess behind the lower right molar was lanced and necrotic tissue found. A blood examination on February 13 showed a white count of 500, there was a marked secondary anemia and a differential count of N. 4%, LM 24%, SM 72%.

At this time there were severe nausea and inability to chew and she was mentally stuporous. Subsequent blood counts showed a progressive anemia with the white count varying from 500 to 1750.

On March 2 Dr. Musser made a diagnosis of agranulocytic angina. On March 6 the red count was 1,120,000 with a hemoglobin of 35% and a white count of 1000. She was hospitalized and transfused with marked symptomatic improvement. Blood cultures at this time showed one short chain streptococcus and three negative cultures; smears from the mouth showed a mixed infection. The red count reached a low figure of 745,000 on March 12 and thereafter both red and white counts gradually rose. On March 18 she received a second transfusion and just before discharge on March 30 a third was given. At discharge blood studies were as follows: Red count 2,550,000, white count 4,000 and a differential of N 32%, LM 0%, SM 68%. She continued to improve slowly and with treatment her secondary anemia cleared up so that on June 4 she had an entirely normal blood picture.

On July 11 she was leaving for the North and a final check-up was made. The white count was 21,000 with a differential of N 29%, SM 34%, E 1%, and 36% abnormally large mononuclears with fine granules, which, if myelocytes, were atypical; the red count was normal. In spite of this somewhat alarming finding it was decided to carry out the original plans so she started motoring North armed with the names of internists along the way. White counts taken en route were: July 18, 66,250; July 23, 101,500; July 30, 133,600. The last two examinations

were reported as showing definite myelocytes. On July 24 the glands in her neck began to swell, there was oozing of blood from her gums, and small purpuric spots appeared all over her body.

On August 4 she was admitted to the Baker Memorial Hospital, physical examination at this time showing a well-developed and rather obese woman lying in bed with bloody saliva drooling from her mouth. She was breathing rapidly and complained of feeling feverish. Her skin was covered with small dark purpuric spots. The gums were swollen and oozing blood all along the tooth margins. There were numerous purpuric spots and bleeding points on the roof of her mouth and in her pharynx. The cervical glands were enlarged, firm and tender. Her course was steadily downhill. A transfusion was given with no benefit; temperature, pulse and respiration all rose steadily and she died two days after admission. Her red count was 3,090,000, hemoglobin 60%, white count 172,000, the smear showing a differential count of N 1%, SM 5%, E 1%, 90% of probably atypical myelocytes and blasts 3%. There was slight achromia and the platelets were definitely decreased.

It was felt that the condition was probably an atypical myeloid leukemia.

An autopsy was obtained and the pertinent findings were as follows: There was a generalized glandular enlargement involving the follicles of the large bowel and the Peyer's patches. In the fatty tissue in the position of the thymus there was a hard nodular mass adhering to the surrounding tissues. The spleen was enlarged and weighed 800 grams. The pulp was very soft and light and the markings were very indistinct. The bone marrow was dark red and beefy in consistency.

The anatomical diagnoses were: Myelogenous leukemia; myeloid infiltration of the liver, spleen, kidneys, thymus and lymph nodes; and symptomatic purpura.

The pertinent microscopic findings were: The blood vessels were all distended and filled with large cells resembling myelocytes. There were very few other forms of leukocytes seen.

There was diffuse myeloid infiltration of all lymphoid tissue and the liver and kidneys.

The spleen showed a marked loss of structure and many myelocytes with very marked capillary engorgement.

The lymph nodes showed a marked loss of structure. The predominating cell was an undifferentiated cell with a round nucleus.

The kidneys showed a cloudy swelling of the tubules with a marked capillary engorgement and myelocytic infiltration of the medulla.

The thymus showed the same formation as the lymphoid tissue elsewhere while the thymic tumor was invading the surrounding fat and connective tissue. The tumor was not encapsulated.

Case Four

A. R. B., an American widow of 70 years, was seen only once, in consultation, four days before she died.

Her past history was entirely negative save for a nervous breakdown seven years ago. She had never had an operation or any severe illness.

She was first seen on December 13, 1930. At that time she complained of fever of two weeks' duration. On December 2 she was seized with acute pain in the lower back and lesser generalized aches. Her temperature at that time was 101°. She was thought to have grippe and the usual treatment was given. After three days the pain in her back ceased but her temperature persisted, running up to 102° at times but fairly frequently being normal for a single observation. Physical examination showed nothing in her chest and she had no cough, coryza, pain or headache.

On December 13 her temperature was 102°, pulse 100 and respirations 20. Physical examination showed a well developed and nourished woman who did not appear acutely sick. Pupils and reflexes were negative. Heart and lungs were not remarkable. Nose and throat were not at all inflamed. There were no enlarged glands. There were small purpuric spots over her forearms, chest, abdomen and legs. There was a large fresh area of ecchymosis on her left side.

Her white count was 800. Smear showed a moderate achromia, total absence of platelets and one granulocyte and 14 lymphocytes out of 15 cells counted.

She failed rapidly during the next three days and died on the morning of December 17.

An autopsy was obtained. The gross autopsy findings were negative save for generalized arteriosclerosis, coronary sclerosis, cardiac hypertrophy and arteriosclerotic kidneys. Microscopic study revealed marked changes in the lymphoid structure. The lymph nodes were not enlarged but showed many myelocytes with numerous mitotic figures in both the sinuses and the pulp. The spleen showed the same changes and occasional megakaryocytes. The bone marrow showed marked hyperplasia of the myelocytic elements with a high proportion of cells too immature to classify. In the liver there was slight central congestion with a few myelocytes in the sinusoids but no leukemic infiltration.

SUMMARY

1. The first case is obviously one of agranulocytic angina, a disease entity, as classified by Roberts and Kracke.

2. The second case is unique in its etiologic agent so far as we can find. There is additional interest attaching to this case from the fact that mercury, a producer of stomatitis par excellence, has not previously been blamed for producing agranulocytic angina. This strengthens the view that the disease entity agranulocytic angina originates in the bone marrow and not in local sepsis.

3. The agranulocytic phase of the third case would probably be classified as agranulocytic aleukemic leukemia, with aplastic anemia.

4. The fourth case is interesting in that at autopsy there was evidence of tremendous proliferation of all the myelocytic elements in the bone marrow and lymphoid structure, while less than four days earlier there was almost total absence of granulocytes in the circulating blood.

CONCLUSIONS

On the basis of observed cases it appears only possible to give a pessimistic generalization. Agranulocytosis is an abnormal response, or lack of response, to a toxic stimulus which should call forth great prognostic caution on the part of the clinician regardless of concurrent findings.

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REFLEX TENDERNESS: A SIGN OF GALL-BLADDER DISEASE*

BY GEORGE LEVENE, M.D.†

IN the course of examination of a large number of patients for possible disease of the gall-bladder, we have observed that tenderness in the right subcostal area is a somewhat uncertain sign. While it is safe to state that a diseased gall-bladder is always more or less tender, the difficulty of eliciting such evidence lies in the fact that the position of the vesicle is subject to considerable variation in different patients, and, not infrequently, in the same individual. Thus, a given point on the skin surface may, or may not, overlie the gall-bladder.

We have had occasion to note, during radiographic examination of the gall-bladder, that tenderness on slight pressure over the right costovertebral angle was of frequent occurrence[1]. Careful checking of the incidence of this tenderness with the presence of cholecystitis or cholelithiasis has led us to regard this sign as of diagnostic importance. In our experience it has been consistently more accurate than subcostal tenderness anteriorly.

Because this sign does not appear to be commonly known, we searched for a possible reference to it in the literature. We found that Boas, in 1895, described this phenomenon as diagnostic of cholelithiasis[2]. We are of the opinion that even lesser degrees of gall-bladder disease can be detected by this sign.

The patient is placed prone on the examining table, the arms by the sides (Fig. 1). The examiner stands at the side, and placing the middle finger and thumb, respectively, over the left and right costovertebral angles, applies gentle pressure, first over the left and then over the right side. He then explores the area from the tenth to the twelfth ribs, in a zone one or two inches from the spine. It is better to palpate the left side first, in order to determine the general reaction of the patient.

In the analysis of one hundred unselected

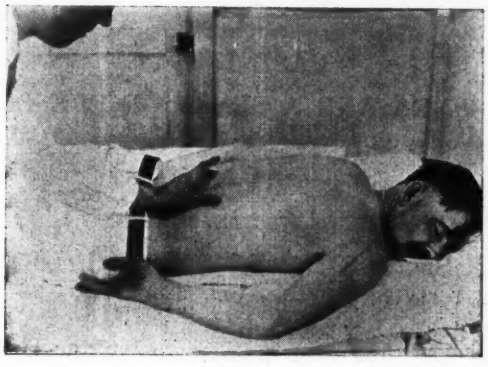

FIG. 1.

cases, we found tenderness over this area, on the right side, in 92.3% of patients showing roentgenologic evidence of gall-bladder disease. It was absent in 95.7% of the cases regarded as normal. Of fifty-two cases of gall-bladder disease, thirteen patients have been operated upon to date, and the diagnosis confirmed by histologic studies. Of these thirteen, 92.3% showed reflex tenderness.

Tenderness due to gall-bladder disease is found invariably higher than that produced by disease of the right kidney. However, its location may vary a distance of one or two ribs, depending on the position of the gall-bladder.

The vagus and sympathetic nerves constitute the viscero-sensory mechanism concerned in this phenomenon[3].

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CONTROL OF INSECT ENEMIES

Intensification of man's perpetual warfare on his insect enemies is foreseen as the result of the establishment in Chicago of the Rex Research Foundation.

The Foundation is an expansion of the Rex Research Fellowship created sixteen years ago at Mellon Institute of Industrial Research, Pittsburgh, Pa., by F. O. Moburg, of Toledo, Ohio. Dr. O. F. Hedenburg, who has headed up the work of the Fellowship from the beginning, now becomes director of the Foundation.

One of the principal objectives of the Foundation, outside of research, Dr. Hedenburg said, will be a program of public education intended to show the necessity of continued warfare against flies and other insect pests that yearly claim thousands of lives in the United States by spreading communicable diseases. In many sections, largely due to the warm, moist weather, and the fact that the public has become indifferent in its fight on the fly, the numbers have increased. With the coöperation of health authorities, the Foundation proposes to teach the public the perils that lurk in the visits of insect pests to the household, and to show the steps to be taken to prevent the spread of disease through these carriers.

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

EDITED BY RICHARD C. CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 17341*

DYSPNEA AND A SENSE OF PRESSURE IN THE THROAT

SURGICAL DEPARTMENT

PRESENTATION OF CASE

DR. SIDNEY C. GRAVES†: This is the case of a man forty-eight years old, a married, unoccupied Turk.

He had had four previous admissions. The first one was fifteen years before the present entry, when he came in and had a tapeworm removed. Six months later he came in with right lower quadrant pain and was subsequently discharged with a diagnosis of possible chronic appendix and ptosis. Ten months later he had a septic cyst of the thyroid drained. Eleven months later he returned with right lower quadrant pain. This time he had his appendix removed. He was discharged with a diagnosis of chronic appendicitis.

During the next five years he came in to the Outpatient Department several times for abdominal pain and upper respiratory infections. Then he was not seen again until two months before his fifth entry to the hospital, when he came to the Outpatient Department complaining of attacks of snatching knife-like pain over the heart accompanied by marked dyspnea, somewhat relieved by lying down. His thyroid was found to have a marble-sized nodule in the center. There was no bruit or thrill. The extremities showed slight fine tremor. His heart was thought to be slightly enlarged to the left. There was a faint systolic murmur at the apex. The blood pressure was 155/98. He was digitalized and given nitroglycerin for the attacks.

He had an x-ray examination which showed no enlargement of the heart. The aortic knob was slightly prominent, but no definite pathologic condition was demonstrated.

He had two basal metabolic rates in the next two months, the first of which was plus 5 and the second plus 6.

He also had an electrocardiogram which showed sino-auricular tachycardia, rate 140 and diphasic T wave, possibly due to digitalis, possibly to coronary disease.

*This report gives the essentials of two discussions, one in Dr. Cabot's Third Year class, another later at a conference of the hospital staff.

†Recently senior interne on the East Surgical service.

On January 15 he came into the hospital with the same complaint of precordial pain. The attacks had occurred three or four times a day. During one of these attacks he felt as if he were going to suffocate. It usually lasted ten minutes and was greatly relieved by nitroglycerin and somewhat diminished by digitalis.

Physical examination was essentially the same as that in the Outpatient Department except that the thyroid seemed to be more enlarged than it was found to be there and there were one or two extra nodules. The blood pressure was 190/110. X-ray showed what was thought to be substernal goiter.

Medical, cardiac and thyroid consultants all agreed that in view of the fact that he had substernal goiter he might be relieved from his anginoid pains by operation. Accordingly a subtotal thyroidectomy was done under avertin supplemented by gas-oxygen.

For the first twenty-four hours he got along well. There was no pain. He did have some hiccups. The following morning at about half-past two, after having been seen by the nurse three-quarters of an hour before, he was found dead in bed.

CLINICAL DISCUSSION

BY RICHARD C. CABOT, M.D., AND GEORGE W. HOLMES, M.D.

NOTES ON THE HISTORY

DR. CABOT: At his second admission the x-ray examination showed "possible chronic appendix and ptosis". In other words they had not the slightest idea what was the matter with him. There was no possible connection with his symptoms, and he went out undiagnosed.

He kept on having the pain after they took out the results of the non-existing chronic appendicitis.

Dr. Holmes, is it worth while to note prominence of the aortic knob in x-ray examinations? Doesn't it usually mean that a man is as old as he is?

DR. HOLMES: Of course the absence of the aortic knob is sometimes evidence of luetic aortitis. That is apt to cause disappearance of the knob. Of course, too, in some cases the knob is more prominent than it should be for the age. I still think it is worth while to mention it.

DR. CABOT: And if it is more prominent than it should be you say he has more arteriosclerosis than he should have.

I think they were bright to be sure the nodule was an adenoma when it was as small as that.

Up to the time of his fifth admission the case is rather puzzling. He has tachycardia. Tachycardia goes with hyperthyroidism, but one cannot have hyperthyroidism with such a metabolic rate as that. The x-rays suggest to me a substernal thyroid, but without pressure symptoms that in itself is not much of a dis-

ease. A good many people carry that without any harm throughout life. So I do not know what is the matter with him so far.

The fact that nitroglycerin gave immediate relief is good suggestive evidence that the pain is of coronary origin.

Up to this point, strong suggestions of coronary disease are the best I have.

NOTES ON THE PHYSICAL EXAMINATION

The blood pressure of 190/110 is rather surprising with a heart that does not seem to be enlarged and no other signs pointing to hypertension.

DIFFERENTIAL DIAGNOSIS

Of course hindsight is more enlightening than foresight. But I think if I had been there I should not have advised operation, because there was very little chance that it would help him. Certainly there were definite suggestions of coronary disease, and that does not make one anxious to operate. Whether he died a coronary death or not I do not know, but that is certainly suggested by its suddenness. I believe that Dr. Mallory will say that he has had more coronary trouble than he had any right to have and probably has had it for a long while. Probably there will be evidence of old infarcts. I think there will be a substernal thyroid*, but I do not believe it did him any harm.

DR. LELAND S. MCKITTRICK: I think this case represents a very interesting principle in surgery in addition to being very interesting as a clinical entity. He came into our ward with a perfectly obvious adenoma of the thyroid, but all we could feel was a little nodule no larger than my thumb nail. It seemed to us that he did not have any symptom indicating that the adenoma was toxic. He did have symptoms which we all interpreted as being due to angina. He was seen again by the Thyroid Clinic; he was seen by a medical consultant; he was seen by one of the other surgeons in the thyroid group, and all agreed that he probably ought to be operated upon. But I think, looking back, that it was all on a mistaken premise; that is: here was a man who had the misfortune to have a non-toxic adenoma of the thyroid that we could feel. The symptoms were absolutely unrelated to the thyroid. He had a basal metabolic rate of only +5. It seems to me that we went a bit astray in operating on him for an incidental finding in the hope that it might influence his angina.

Of course another thing that influenced us was the feeling that he had a substernal goiter. Operation did not confirm this impression. There were a number of small nodules throughout the thyroid which were not felt preoperatively. The left lobe of the thyroid was a little low; it was not substernal however.

*Dr. Cabot's discussion was given without the benefit of Dr. Holmes' opinion given below.

This case is not unusual. We are frequently asked to see patients who have symptoms and surgical lesions present, but the symptoms which they have are not characteristic of the lesion found. I believe that in operating on a patient who has a surgical lesion we must be extremely careful to be reasonably sure that this lesion explains the symptoms for which the patient comes to us.

DR. HOLMES: There are a few points in connection with this case that are of importance and should be discussed. This shadow which you see coming down to the right of the midshadow is distinctly abnormal. In interpreting these films I do not think we were justified in saying that the shadow is due to a substernal goiter. It is often difficult to determine from an x-ray film whether a goiter is substernal or not. Such shadows are often misinterpreted, I think. Certainly we ought to have a really definite shadow well below the sternal notch before we say definitely that the patient has substernal goiter.

Another point is whether or not the goiter is causing pressure on the trachea. We ought to be able to answer that question. In this view you can see the trachea and can see that it is not narrowed in the region of the thyroid. We should have had films in the lateral plane also. If we had taken a lateral view of the chest we ought to have been able to answer fairly positively that whatever symptoms he had were not due to pressure on the trachea.

The x-ray examination of the heart is just what one would expect with what the patient had. There was no enlargement of the heart, no aneurysm, no mediastinal tumor. As Dr. White has pointed out, the x-ray is of no particular value in the diagnosis of coronary thrombosis or angina except in ruling out other things.

I wonder why radiation treatment was not considered in this case.

DR. JAMES H. MEANS: I think I agree with what Dr. McKittrick has said. I think the case emphasizes the fact that we must think of the whole human being and not merely of the goiter. We seem to be getting into the way of not knowing whether there is any such disease as thyroid adenoma, and our ideas about the indications for treatment in nodular goiter without hyperthyroidism are in a chaotic state. We discussed these matters yesterday in our clinic and agreed that it is time for us to look over all our material on so-called adenomatous goiters and formulate some sort of policy regarding indications for operation. The only indication here would seem perhaps to have been the possibility of pressure, either present or in the future. There was no hyperthyroidism clearly, no possibility that operation would do anything for the angina pectoris. The only circumstance in which thyroidectomy will help angina pectoris is when thyrotoxicosis is present. Then it may help materially.

X-RAY INTERPRETATION

The fluoroscopic findings are consistent with substernal thyroid.

CLINICAL DIAGNOSES (FROM HOSPITAL RECORD)

Substernal adenomatous goiter.
Angina pectoris?

DR. RICHARD C. CABOT'S DIAGNOSES

Arteriosclerosis of the coronary arteries.
Probably old infarcts.
Substernal thyroid.

ANATOMIC DIAGNOSES

1. *Primary disease.*
   Arteriosclerosis of the coronary arteries with occlusion of one of the larger branches of the left coronary.
   Infarct of the heart.
2. *Secondary or terminal lesions.*
   Colloid goiter.
   Hyperplasia of the spleen.

PATHOLOGIC DISCUSSION

DR. TRACY B. MALLORY: Autopsy showed, as would of course be expected from the history of his very sudden death, an infarct of the heart. It was a little unusual in being well up towards the base of the left ventricle instead of towards the apex. There was very marked sclerosis of the coronaries and the small vessels in the immediate neighborhood of the infarct. The corresponding coronary branch, one of the larger branches of the transverse portion of the left coronary, was totally occluded. In gross we thought that the infarct was fairly fresh, but on microscopic examination we find that the muscle is replaced by fairly dense old fibrous tissue. I think the infarct must have been present a matter of months in all probability. It is interesting that his heart was perfectly normal in size, weighing only 300 grams, rather small for a full-sized man.

DR. CABOT: There were no other infarcts in the heart, just this single one?

DR. MALLORY: No others.

The goiter itself was a nodular colloid goiter with no evidence of hyperplasia. An incidental finding was a parathyroid attached to the capsule.

The only other finding was a spleen weighing 400 grams for which I can give no explanation except that he was a Turk.

A PHYSICIAN: Did the big spleen show anything characteristic? Might it have been a so-called Mediterranean spleen?

DR. MALLORY: Yes. I do not know any characteristic appearance for those big spleens, though.

DR. FRANCIS T. HUNTER: Are they fibrotic spleens?

DR. MALLORY: Not necessarily.

This case is interesting from the point of view of the relation of hypertension to cardiac infarction. The case fits very well in one respect with most of the recent infarcts of the heart we have had here. In cases where the heart has been normal in size and we found an infarct at autopsy there has always been obvious complete occlusion of a major coronary branch. In hypertrophied hearts, however, we have not infrequently found infarcts and have not been able to demonstrate any point of occlusion, though well marked sclerosis has always been present.

DR. F. DENNETTE ADAMS: It is Dr. William H. Smith's teaching that clinically a man with angina and a small heart under treatment will sometimes develop hypertrophy, and that this is an index of better coronary circulation than would be the case in a patient in whom there is no hypertrophy. The establishment of hypertrophy to a certain extent must depend on the condition of the local circulation.

DR. MALLORY: I have always interpreted the postmortem findings the other way. I have felt that when I found a hypertrophied heart in association with infarction, the hypertrophy had preceded rather than followed the infarction. There are also the cases of complete occlusion of one or both coronary arteries without infarcts. That is not extremely rare in a normal sized heart and it is distinctly uncommon in a hypertrophied heart.

CASE 17342

SIGNS OF MEDIASTINAL OBSTRUCTION AND PAROXYSMAL AURICULAR FIBRILLATION

MEDICAL DEPARTMENT

PRESENTATION OF CASE

DR. EARLE M. CHAPMAN*: This is the case of a fifty-six year old married French Canadian farm laborer who entered the hospital on April 2. His chief complaints were dyspnea, palpitation and precordial pain of four years' duration. The student who took the following history noted that evaluation was difficult because of the serious condition of the patient.

His present illness dated back seven or eight years, when he began to have some shortness of breath on extreme exertion, at infrequent intervals apparently. He had also some sensation of precordial tightness. He continued to work until four years before entry, when he had pain in the right upper quadrant associated with exertion, also edema of the legs and feet and some swelling under the eyelids. He stayed at a hospital one week, in which time the edema disappeared. He went back to work, leading a fairly

*Recently senior interne on the West Medical service.

active life. In spite of rest periods the dyspnea and edema returned and he began to need several pillows at night. He continued in about this state until about two weeks before entry, when dyspnea on exertion became so severe that he was forced to stay in the house. The edema was now up to the sacrum. A dry cough had developed and both arms were swollen to "twice their normal size". At the time he came in he was having some right upper quadrant pain, not very severe.

The family history is non-contributory. He had been married sixteen years, his wife having had only one pregnancy, a full term child who died at the age of two days.

Past history. He had drunk very heavily until twenty-two years before admission, when he suddenly stopped. He had gonorrhea thirty-five years before admission. He had no knowledge of a chancre or skin manifestations. Twelve years before entry his hair had fallen out. It had been generalized loss, not in localized areas. He had had nocturia once or twice a night for four years and had been slightly deaf for the past two or three years.

Physical examination by Dr. Wheeler showed a well developed, well nourished man, orthopneic, cyanotic and edematous over the ankles, legs and sacrum. There was a good deal of dental caries. His heart was not enlarged, measuring only 8 centimeters to the left in the fifth interspace, but there was enlargement as measured across the supracardiac area, 8 centimeters in the first space and 7 in the second. The action was slow, the rhythm regular. The sounds were of poor quality. A short early systolic murmur was heard over the entire precordium. The blood pressure was 98/90 on the right, 100/75 on the left. The lungs showed only a few sibilant râles at the right apex posteriorly after cough. The right diaphragm was fixed. The abdomen showed a nodular mass in the right upper quadrant. The respiration was rather shallow and we felt that that was why the mass did not descend. No definite edge was felt. Three days after admission dullness in the flanks and definite fluid wave were described. All the extremities showed marked pitting edema.

The laboratory reports show that he had a large trace of albumin in the urine at one time which gradually cleared to a slight trace. He had a red blood cell count of 5,000,000, a white cell count of 10,800 and hemoglobin of 80 per cent. The blood non-protein nitrogen was 75 at entrance, 135 four days later. A Hinton test was negative. A blood smear at admission showed moderate polychromatophilia. There were 9 per cent mononuclears; otherwise the differential count was normal. An electrocardiogram showed normal rhythm, rate 100, low voltage, low T_1 and T_2.

His *course in the hospital* was rapidly downhill. He soon became jaundiced and more cyanotic and dyspneic. A quantitative van den Bergh done April 3 showed 7 milligrams of bilirubin. Along with the other signs of pressure were râles at the right apex.

Dr. Bock saw him two days before death and said: "Patient mortally ill. Cyanosis of face, trunk and arms, with slight icterus. Fully distended veins of neck which show little if any pulsation. Radial pulses cannot be obtained and blood pressure readings unobtainable in both arms. Heart sounds distant; fibrillating. Both bases of lungs full of moist râles. Cheyne-Stokes respiration. Abdomen: edema of skin; flat umbilicus, distention in upper half; tympanitic all over. No masses felt. Free fluid in abdomen. Edema over sacrum. No clubbing of toes. Left foot cold and blue due probably to slow arterial occlusion. Moderate edema of both legs. Both femorals pulsating. Patient today gives picture of both upper and lower mediastinal obstruction which may be secondary to chronic adhesive pericarditis. I doubt if he has liver disease except for passive congestion."

On April 8, six days after entry, the patient died.

Clinical Discussion

Dr. Roy R. Wheeler: The striking feature about this case is the physical examination. I think anyone who had seen this patient would have said that he had mediastinal obstruction. There was extensive edema of the legs, also of both arms, edema over the sacrum and free fluid in the abdominal cavity and both pleural cavities. The admission diagnosis was cirrhosis of the liver. He had a very muscular upper abdomen, and the opinions were about evenly divided that he did and that he did not have an enlarged liver. The physical examination was more interesting than the history in that it was very misleading and that we all expected to find definite mediastinal obstruction from a chronic adhesive mediastinitis.

Dr. Chapman: The note as given by Dr. Thorp shows that the enlargement was greater across the upper part of the chest.

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for several days. It was so diffuse that we did not feel that it was definitely cardiac in origin. It might well have been due to mediastinitis.

DR. CHAPMAN: X-rays were taken which were rather unsatisfactory. The report is: "Plain films of the abdomen show a triangular area of density in the region of the liver descending to the crest of the ilium. The heart shadow is grossly enlarged. The pulsations of the left ventricle are rapid. The pulsations of the right auricle are extremely weak and much more rapid than those of the left ventricle. The supracardiac dullness is increased. The aorta appears tortuous. It is difficult to determine whether or not the aorta is dilated. The lung roots are increased in width and density. There are no large mediastinal masses seen. There is dullness at the base which partially obliterates the costophrenic angle."

DR. AUBREY O. HAMPTON: He was very difficult to examine because of the dyspnea. These are the oblique views of the aorta. I took this with the patient sitting on the table. I did not see anything very striking in the way the chest expanded or in the movement of the diaphragm. That peculiar pulsation of the heart was present. This shadow is what we usually call the right auricle. It was going much faster than this shadow, which represents the left ventricle. I did not think he had enough in the mediastinum to explain the symptoms.

DR. MEANS: Was the pulmonary artery dilated?

DR. HAMPTON: I think the descending aorta probably obscures the pulmonary artery.

This is a film of the abdomen. In the upper right quadrant you can see the triangular area of dullness described in the record. I thought this dullness represented an enlarged liver.

X-RAY INTERPRETATION

All the variations from the normal might be secondary to heart disease.

CLINICAL DIAGNOSES (FROM HOSPITAL RECORD)

Arteriosclerotic heart disease.
Congestive failure with general anasarca.
Bronchopneumonia.
Chronic nephritis.

ANATOMIC DIAGNOSES

Arteriosclerosis.
Coronary sclerosis.
Cardiac infarct with mural thrombosis.
Acute aortitis.
Hypertrophy of the heart.
Multiple infarcts of the lungs.
Thrombosis of the perivesical veins.
Chronic passive congestion.
Abscess of the pancreas (colon bacillus).

PATHOLOGIC DISCUSSION

DR. MALLORY: This is another case in which the anatomic and the clinical findings seem rather strikingly different.

The liver being mentioned last in the discussion, I will mention it first, as it was distinctly smaller than normal, a condition sometimes found in long-standing passive congestion. This bears out Dr. Holmes's warning that the size of the liver as shown by x-ray is sometimes very confusing.

The heart was very much enlarged and showed a large area of infarction. I think that Dr. Hampton's observation about the difference in rate between the auricle and the ventricle is possibly correct, because the major portion of the interventricular septum was involved in the infarct. If that is true it is surprising that the electrocardiogram did not show it.

DR. HAMPTON: That electrocardiogram was done immediately after we fluoroscoped the patient, too.

DR. MALLORY: He may have had heart block at certain times and not at others.

DR. WHEELER: Fibrillation was present off and on.

DR. MALLORY: These infarcts which involve the septum are interesting in that in some instances it is possible to make an accurate diagnosis as to where the area of infarction is. It is possible in these cases for thrombi to develop within both the right and left ventricles. And it is possible too to get emboli in both the major and the minor arterial circuits at the same time. This man had large infarcts in the lung. I think the infarction must have occurred subsequent to the x-ray examination. The infarcts were scattered pretty evenly over both lungs, and were very large—8 centimeters—about as large as an infarct can be; that is about half of the lobe. I think almost certainly this must have been practically a terminal event, within the last twenty-four hours certainly.

There was no adherent pericardium. I have no explanation whatever, except the size of the heart, for the suggestion of mediastinal obstruction. The large veins were negative. The pulmonary artery was not dilated.

DR. WHEELER: He was the picture of mediastinal obstruction. It was the first thing that impressed everyone who saw him.

DR. HAMPTON: How do you explain the paroxysmal attacks?

DR. WHEELER: He had marked Cheyne-Stokes respiration.

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WHO IS BLOCKING MEDICAL PROGRESS?

A RECENT newspaper headline which appeared the morning after the delivery of the Annual Discourse at the celebration of the one hundred and fiftieth anniversary of the Massachusetts Medical Society indicated that the responsibility for delay in progress in medicine is to be laid at the door of the medical profession. Again and again, the pioneer has striven in vain against the ignorance, inertia or active opposition of his colleagues. But does not this attribution of malign influence (by the newspaper headliner or whatever may be the proper designation of the large type addict) imply a control of the situation by the medical profession out of keeping with the facts?

The obstacle to progress in medicine is a state of mind usually determined by a background of unrecognized and generally unformulated hypotheses, which state of mind is more prevalent outside than inside the medical profession. It is this background of prejudices that makes the introduction of a scientific point of view an almost catastrophic innovation. Our intense conservatism and natural inability to adjust ourselves intelligently to an environment of new ideas usher in our characteristic intolerance. We like to be regarded as progressive, but so-called progress without real change is very dear to our hearts.

We pride ourselves on our science, but we are careful not to use it freely, and, apart from a few technical procedures, especially careful not to apply the scientific method in daily life. Scientific consideration of the tariff, of taxation, of politics, of governmental administration in general, we are inclined to think involves a contradiction in terms. In matters of health we consider science almost not at all. In the elementary stages of science there is collecting and classification of data. Have we any scientifically collected and classified public health statistics? Perhaps, but such characterization of our statistics is really a gesture of unwarranted generosity.

Is experimentation on living animals justified on scientific grounds? A few, relatively few, people who know something about it are convinced that it is. Most people are indifferent to whether animals are or are not tortured, but if their attention is caught by the noise of the antivivisectionists they are inclined to think that experiments in laboratories are rather unnecessary, and really it is too bad, the way they cut up animals alive. Of the facts concerning scientific experiments on animals they are ignorant, and to the merits of what is involved they are indifferent. The inestimable value to mankind of certain critical experiments on animals is quite beyond their understanding.

Is there any scientific evidence on the value of vaccination against smallpox? Not if it is true that a neighbor's child died of sepsis after vaccination! That settles the question for some of us! A comparison of the results obtained in dealing with smallpox in large groups of people over a period of years by the methods of vaccination and non-vaccination carries no weight. Vaccination as now practiced may be superseded, in time, by another method even more satisfactory, but to regard it as less than the best way known at present of dealing with the problem of smallpox is to go in the face of the evidence. Derogatory adjectives might be piled up, but within the field of science, "unscientific" is intrinsically the greatest condemnation.

Science is not perfect, nor the scientific method fool proof. Scientific means, after all, in accordance with the evidence, when an honest and earnest and thorough search for the evidence has been made. Those persons are responsible for blocking the progress of medicine, as of other lines of human activity, who, chiefly outside the medical profession, refuse to be guided by the evidence and substitute therefor opinion and ignorance and prejudice.

THE U. S. PUBLIC HEALTH SERVICE AND INDUSTRIAL POISONS

THE U. S. Public Health Service is issuing, in the *United States Daily*, a series of short articles on the protection of wage earners from chemical poisons. The service has for some time been making investigations in industrial chemical plants for the purpose of establishing such standards of workroom environment as will insure conditions compatible with the maintenance of good health. Some of these investigations have been concerned with the study of methods of ventilation for the removal of toxic dusts, gases and fumes; others have dealt with the protection of individual workers through the use of different types of respirators, gas masks and positive pressure air helmets.

The Service has at times been able to allay undue apprehension on the part of the public as to the dangers of new chemicals introduced into the industries. A striking introduction of this occurred in connection with the use of lead tetraethyl as an anti-knock in gasoline. It seemed to some that the introduction of this admittedly very toxic agent into motor fuel would be a real hazard. But the Public Health Service, after a thorough investigation, showed how it could be safely used; billions of gallons of "ethyl" gasoline have been used without a single case of injury. The British Government paid the Service a high compliment when, after a thorough study of the U. S. reports, it decided to admit the use of ethyl gasoline in England without further investigation.

The country is to be congratulated on having an agency, the intelligence and impartiality of which is so universally recognized.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

MCFEE, WILLIAM D. M.D. University of Vermont 1897. Visiting Physician, Department of Physical Therapy, Boston City Hospital. President, New England Society of Physical Therapy. Trustee, American Academy of Physical Therapy. Vice-President, International Congress of Physical Therapy. His subject is: "Physical Therapy in Retrospect." Page 367. Address: 520 Commonwealth Avenue, Boston.

HOLLAND, JOHN A. M.D. Hahnemann Medical College, Philadelphia, Pa., 1919. Consultant Neuropsychiatrist, McKinley and Chambersburg Hospitals, Trenton, N. J. Neurologist, Hahnemann and Children's Hospitals, Philadelphia, Pa. His subject is: "Physical Treatment of Mental Illness." Page 371. Address: 823 W. State Street, Trenton, New Jersey and 1113 Medical Arts Bldg., Philadelphia, Pa.

PERKINS, CLIFTON T. A.B., M.D. Boston University School of Medicine 1926. Assistant Superintendent, Worcester State Hospital. Instructor in Therapeutics, Boston University School of Medicine. His subject is: "Hyperthermia in Dementia Paralytica." Page 374. Address: Worcester State Hospital, Worcester, Mass.

ROBINS, SAMUEL A. M.D. Tufts College Medical School 1914. Director, X-ray Department, Beth Israel Hospital. Roentgenologist, Boston Lying-in Hospital and the Evangeline Booth Hospital. Clinical Professor of Roentgenology, Tufts College Medical School. Address: 636 Beacon Street, Boston. Associated with him is:

SHAPIRA, ALBERT A. S.B., M.D. Harvard University Medical School 1913. Second Assistant Visiting Surgeon, Beth Israel Hospital. Instructor in Surgery, Tufts College Medical School. Address: 587 Beacon Street, Boston. Their subject is: "The Value of Hysterosalpingography. A Study of 1000 Cases." Page 380.

DRESSER, RICHARD. Ph.B., M.D. Johns Hopkins University School of Medicine 1921. Roentgenologist, Memorial Hospital, Worcester and Pondville Hospital, Norfolk. Visiting Roentgenologist, Massachusetts General Hospital. His subject is: "The Roentgen Examination for Peptic Ulcer with Special Reference to Those Cases Presenting Unusual Difficulties in Diagnosis." Page 395. Address: Memorial Hospital, Worcester, Mass.

RAGLE, B. HARRISON. A.B., M.D. Harvard University Medical School 1916. F.A.C.P. Associate Physician, Massachusetts General Hospital. Address: 226 Marlborough Street, Boston. Associated with him are:

ADAMS, F. DENNETTE. Litt.B., M.D. Harvard University Medical School 1917. F.A.C.P. Instructor in Medicine, Courses for Graduates, Harvard University Medical School. Associate Physician, Massachusetts General Hospital. Address: 226 Marlborough Street, Boston. And

FAY, JOHN HOWARD. A.B., M.D. Harvard University Medical School 1927. Assistant in Medicine, Massachusetts General Hospital. Address: 226 Marlborough Street, Boston. Their subject is: "Agranulocytosis." Page 400.

LEVENE, GEORGE. M.D. Boston University School of Medicine 1925. Associate Member, Evans Memorial for Clinical Research and Preventive Medicine. First Assistant Roentgenologist, Massachusetts Memorial Hospitals. Instructor in Roentgenology, Boston University School of Medicine. His subject is: "Reflex Tenderness: A Sign of Gall-Bladder Disease." Page 403. Address: 351 Winter Street, Norwood, Mass.

The Massachusetts Medical Society

TO THE SECRETARIES OF THE DISTRICT MEDICAL SOCIETIES

American Medical Association
Bureau of Medical Economics
535 North Dearborn Street, Chicago

August 10, 1931.

Dr. W. L. Burrage,
182 Walnut Street,
Brookline, Mass.

Dear Doctor Burrage:

The Bureau of Medical Economics, which has been established to study all phases of general economics having a bearing on the practice of medicine, is now prepared to initiate the first of its studies. A fair summary or analysis of the several phases of medical economics must, of necessity, take into consideration conditions, practices, tendencies and opinions as they actually exist throughout the country.

In order that we may obtain the most reliable information upon which to formulate general policies and principles, we propose to ask the state and county medical societies for definite information concerning those phases of medical economics with which they have had experience.

We hope we may have your full coöperation in this work to the extent that you urge your county societies to study the schedules very carefully and return to us answers that are complete and accurate. If you find any objection to this method of procedure, please inform us at once and we will respect your desires.

In so far as possible we desire also to have the schedules answered by the state medical societies. The first schedule is enclosed. We assume that it may require time to formulate answers to some of the questions; however, we shall appreciate as early a reply as may be consistent with thoroughness and comprehensiveness.

Yours very sincerely,
R. G. Leland, M.D., *Director*,
Bureau of Medical Economics.

SCHEDULE ON MEDICAL ECONOMICS

Date.....193..

To: The Bureau of Medical Economics, American Medical Association, Chicago, Illinois.

.....Medical Society, with headquarters at
City.....State.....
President.....Address.....
Secretary .....Address.....
Regular Meeting Day.....Number of Members.....

A. Dispensaries and Clinics

1. Are there any pay clinics, incorporated or unincorporated, for profit or not for profit, in your community? YES ☐ NO ☐. How many? 2. By whom are these pay clinics operated? 3. How many members of the county medical society participate in or support the work and activities of these clinics as members of the clinic staff? 4. Have these clinics adopted and published clinic fee schedules? YES ☐ NO ☐. (Attach fee schedules here.) 5. Was the county or state medical society consulted in determining the amounts in the fee schedule? YES ☐ NO ☐. 6. Is there, in your community, a central registry which attempts to determine the financial responsibility of persons applying for free medical service? YES ☐ NO ☐. 7. What method or formula is used by the dispensaries and clinics in determining the ability of patients to pay for general or specific treatment? 8. Does your county medical society have a clinic and dispensary committee? YES ☐ NO ☐.
9. Has the county medical society taken any action approving or disapproving free dispensaries and clinics? YES ☐ NO ☐. 10. If so, what action has been taken? 11. Has the county medical society taken any action concerning pay clinic activities? YES ☐ NO ☐. 12. If so, state briefly the action taken or the resolutions adopted. 13. What is the average monthly attendance at dispensaries and clinics in your community? 14. Are the dispensary and clinic activities in your community interfering in any way with the private practice of medicine? YES ☐ NO ☐.
15. If so, in what way?

MISCELLANY

A BROADCASTING MESSAGE PREPARED AND SPONSORED BY THE COMMITTEE ON PUBLIC EDUCATION OF THE MASSACHUSETTS MEDICAL SOCIETY FOR THE DEPARTMENT OF PUBLIC HEALTH

Red Lights of Middle Age*

A few years ago Dr. Leonard Williams of London write a book entitled Middle Age and Old Age. In it is a chapter called "Red Lights", in which are discussed those signs of advancing years which appear in man while he still is, or still believes himself to be, in his prime. Dr. Williams' book was written for doctors, primarily, but his "red lights" are of interest to us all.

If there is no traffic officer in sight we are sometimes tempted to ignore red lights that flash before us. We are in a hurry, and some of us are driving heavy cars on slippery pavements. We are more conscious of the few dollars we are trying to add to the family budget than we are of the few inches we may be adding to our belts, or the few millimeters we may be adding to our blood pressures. Many crashes might be averted if we were more heedful of these traffic signals. The Court to which we are eventually summonsed is higher than any made by

*Broadcast May 20, 1931.

man, and a good record is usually taken into consideration by the Presiding Magistrate.

A statement of what constitutes "middle age" in years is a matter of opinion. Philosophically we begin to grow old before we are born, or, in Jaques' melancholy words:

"From hour to hour we ripe and ripe,
And then from hour to hour we rot and rot."

The purpose of this talk is to point out a few of the signs of this mellowing process, and to indicate a few of the measures we can take to stay it.

The commonest red light for the middle-aged man is that of obesity. So common is it that even the insurance companies look upon a gain of ten or fifteen pounds in weight between the ages of thirty and fifty as a normal phenomenon. If all people limited themselves to such a gain in weight between these ages, it would hardly be worth notice, but it is well known that such is not the case. A gain of thirty or more pounds conforms with common experience. If you stop to ask yourself why, physiologically, this is so common, you may at once recognize two causes, both of which overtake men in their prosperity. The first is overeating and the second lack of exercise.

People overeat for two reasons, and for men there is often a third reason. The first reason is a matter of gluttony. They like to eat. They like to eat so well that they create artificial appetites, by means of spices and condiments, thus not only gorging themselves but presenting to their excretory organs for elimination material which is stimulating if not irritating. The second reason is the false but widely held idea that a lot of food "keeps up their strength". And this in spite of the fact that their sedentary lives call for the exertion of less rather than more "strength". The third reason which frequently applies to men is the obsession on the part of many women to "feed" the "brute". The origin of this obsession is the idea that feeding makes the "brute" good-natured. Perhaps it does—certainly it lulls him into that lethargy which follows overeating in both man and animals. Furthermore the brute is sometimes helpless in that he dares not simplify or limit his intake for fear of offending his cook. The easiest way for him may be to eat it and say nothing.

If there is no way out, and an excessive intake must be indulged in for family reasons, the physiological antidote called for is an increase in the output. This increase in the output can be secured by exercise only, and nowadays the exercise of many middle-aged people is severely reduced because, forsooth, at middle age they can afford to travel in automobiles. The man who at twenty got his exercise on the athletic field or walking to and from his work to save his carfare, at forty is very apt to take his exercise in the concrete stadiums on Saturday afternoons, and in gently applying his four-wheeled brakes on his way to work on weekdays. Even the rubber industries have conspired against him now, in making it seldom necessary to change a tire. And all the time his food is being "digested, assimilated and stored, as it were, for a rainy day. When the rainy days fail to appear, and the intake is not reduced, the amount stored increases day by day, and obesity is the unlovely result".

If the unloveliness of obesity were its only disadvantage, it would be a small matter, but fat is heavy and must be transported by its owner. The person who weighs two hundred pounds must do as much work, day in and day out, as the person who weighs a hundred and fifty pounds would have to do if he carried fifty pounds of rock with him, day in and day out. It is no wonder that the fat person gets out of breath. His carburetor is choked and his cylinders are full of carbon. His mileage will be poor. Most of us can count on the fingers of one hand all the people we have ever known who were both vigorous and fat at eighty, or just plain fat at ninety. The reason for this is that fat people are short-lived, and this, in turn, is the reason that obesity is a "red light in middle age".

The control of body weight for the healthy individual is a matter of balance between food intake and exercise output. Most people can regulate this balance effectively and easily for themselves. If they cannot they should see their physician. Fat people should reduce to reasonable proportions, and once reduced, they should "go and sin no more".

Another "red light" in middle age is breathlessness on exertion. When a person gets out of breath on climbing a flight of stairs it is because the exertion of climbing temporarily overloads the heart. It may not be because the heart is getting weaker,—(although one does not expect it to be so strong at 50 as it is at 20); it may be simply that the person is heavier and is therefore asking the heart to do more work. Here again, reducing the weight will reduce the load the heart is asked to carry. Or it may be that breathlessness is due to a heart that is actually weakened by the passing years—or even by the onset of one of the various types of heart trouble. At any rate, increasing breathlessness on exertion is an indication to stop, then let your doctor listen for you.

The measuring of the blood pressures may be of significance in middle age. Just what the cause of high blood pressure is, we do not definitely know, but it is often thought to be the result of living under the high pressure that many of us are forced to live under in our present economic structure. Doctors are frequently asked what the normal blood pressure is—and they have much difficulty in giving an answer to such an apparently simple question. The fact is that people are no more made with fixed blood pressure levels than they are with fixed sizes and shapes of ears. There is a large individual variation in what may be called a "normal" blood pressure. Furthermore, there is a large normal variation, or elasticity, in the height of the blood pressure for any given person, depending upon the time and the circumstances under which it is measured. Blood pressure readings, then, cannot be measured

in millimeters of mercury, but must be interpreted, if they are to be of any great significance. Properly interpreted, blood pressure readings are helpful to your doctor in appraising your physical condition —and so interpreted they may constitute for you a distinct "red light" on the road to middle age.

When you go to your doctor for a health examination he will want to examine your urine—for it is by such examination that other "red lights" may be discovered. Poor function of the pancreas, the kidneys or the bladder may be revealed by the examination of the urine. There are other little irregularities, such as attacks of dizziness, ringing in the ears or unnatural bleeding from any part of the body that may come to the attention of middle-aged people. They may or may not be of importance as warnings that something is wrong. The cautious person will not only have them investigated by his physician, but will periodically visit his physician for what is called a "health examination". It is the purpose of the health examination, not only to detect the "red lights"—but also the "yellow lights" of middle age; to inspect your brakes; to focus your headlights and to give you a feeling of confidence as you drive along the highways of life.

USE OF HYDROCYANIC ACID GAS FOR FUMIGATING

In a report recently published by the United States Public Health Service, the use of various fumigating materials, particularly hydrocyanic acid gas, is discussed. Hydrocyanic acid gas is a deadly gas. Persons unfamiliar with its use and effect should not expose themselves to it. This report indicates that trained fumigators can handle the most deadly gases with safety, both to themselves and others. It is, on the other hand, quite as true that in the hands of the uninformed or careless, many forms of fumigation are a menace to all concerned.

The report emphasizes that fumigating materials, particularly the deadly gases, should be handled only by persons trained in their use and who have the necessary equipment such as gasmasks, to protect themselves as the occasion requires. These gases should never be used without the full knowledge and consent of the local public health or police authorities. Hydrocyanic acid gas should never be used in buildings without combination with a warning gas.

X-RAY MEASUREMENT AND PROTECTION

The third international congress on radiology, according to the *New York Times*, has named a committee to draw up a definition of a unit for the measurement of x-rays by various standard measurements, to make a comparison of x-rays and Gamma rays, and to establish a unit for the measurement of Gamma rays. This committee is composed of the Duke de Broglie of France, chairman; Drs. Friedlich of Germany, Kaye of England, Sievert of Sweden, Solomon of France, Pugnovanoni of Italy and Taylor of the United States Bureau of Standards.

Another group was designated to continue the study of the question of protection in the use of x-rays and radioactive substances. It will also study the risks attendant on the combustion of films. Its members are Dr. Sievert, honorary president; Drs. Kaye and McGregor, honorary secretaries; Dr. Failla of Memorial Hospital, New York City, Dr. Grossman of Berlin and Drs. Pugnovanoni and Solomon. This group will act under the presidency of Dr. René Ledoux-Lebard.

CORRESPONDENCE

MASSACHUSETTS COMMITTEE ON THE WHITE HOUSE CONFERENCE

August 10, 1931.

Editor, *New England Journal of Medicine*,

Governor Ely's Massachusetts Committee on the White House Conference on Child Health and Protection is organizing a speakers' bureau on the various sections of the Conference.

Section 1, devoted to medical service for the child, would seem to be of particular interest to the physicians, and if any medical society or club is interested in a speaker for this Section, we would be glad to furnish one. Our list of speakers includes such names as Dr. Kenneth Blackfan, Dr. Richard Smith, Dr. Robert DeNormandie, Dr. Robert Osgood, Dr. Harold Stuart, Miss Ida Cannon, Miss Stella Goostray, and the like. In addition, we have speakers on Section 2, Public Health Service and Administration; Section 3, Education and Training; and Section 4, The Handicapped.

The principal purpose of this Committee seems to us to build up among our people informed public opinion in regard to the health and protection of our children, to the end that progress in this direction may be made.

We bespeak the coöperation of the medical profession in this endeavor.

Yours truly,
GEORGE H. BIGELOW, M.D.,
Commissioner of Public Health.

RECENT DEATHS

PROUTY—DR. ALBERT HENRY PROUTY, a practitioner in North Brookfield for 39 years, died at his home in that town after a long illness from cancer of the lower jaw, August 3, 1931, aged 64.

The son of Benjamin and Lucy Pepper Prouty he was born in North Brookfield, August 28, 1866. When he was graduated from the North Brookfield high school he entered Harvard Medical School and received his M.D. there in 1890. He settled in practice in Oakham and moved to North Brookfield in 1892, later serving the town as school physician and as chairman of the board of health. He was noted for his many acts of charity and had a legion of friends.

His memberships included Sawyer Mathieu Post, No. 41, American Legion, Quaboag Valley Medical Association and the Massachusetts Medical Society.

Dr. Prouty is survived by his widow, Annie I. Marshall Prouty, and by one son, Lieutenant Stanley H. Prouty, now stationed at Fort Hamilton, New York.

CARSON—Dr. Norman Bruce Carson, professor-emeritus of surgery in Washington University Medical School, has died at his home in St. Louis at the age of eighty-six. He was a pioneer in surgery of the brain and spinal cord.

FULTON—Dr. John S. Fulton, former president of the American Public Health Association and for twenty years a leading figure in hygiene and health organization, died in Baltimore on August 12, at the age of 72. For years Dr. Fulton was the head associate of the Maryland State Health Department.

NEWS ITEMS

TO ESTABLISH MODEL HEALTH DEPARTMENT—The Rockefeller Foundation and the Johns Hopkins School of Hygiene and Public Health, according to the *Boston Transcript*, are to participate in the establishment in Anne Arundel County, Maryland, of a model health department to work out problems of preventive medicine. Dr. J. J. Janney of the Rockefeller Foundation will be in charge.

NEW FEDERAL INSTITUTION—Selection of Springfield, Mo., as the location for the new $2,500,000 Federal Hospital of Defective Delinquents has been announced by the Department of Justice, according to the *New York Times*.

The capacity of the institution will be 850 beds, of which 500 will be for insane and psychopathic patients, 150 for tuberculous patients and 200 for chronic medical cases.

INFANTILE PARALYSIS GAINS—Infantile paralysis cases in the United States almost doubled for the week ending August 8, as compared with the preceding week, the Public Health Service having reported 1,029 cases in forty-seven States, as compared with 598 cases for the preceding week.

New York State reported 676 cases for the week, as compared with 433. Of these 591 were in New York City, as compared with 404 the previous week.

The Service, however, made computations which showed the disease in New York now only about half as deadly as the infantile paralysis epidemic there in 1916.

States in which the cases numbered more than ten were: Massachusetts 67, Rhode Island 16, Connecticut 97, New Jersey 55, Illinois 15, Michigan 17, Minnesota 13.

NATIONAL CATHOLIC HOSPITAL—Plans for a $3,000,000 national Catholic hospital and sanatorium for aged, sick and infirm priests were announced on August 12 at a citizens' meeting sponsored by the Chamber of Commerce of Raton, N. M., according to the *New York Times*.

The institution will be the only one of its kind in the country, and will be operated by the Sisters of Mercy. It will be financed through a national campaign and maintained by an endowment fund. Construction is expected to start this Fall or early next Spring.

The institution will be named Mount St. Paul the Apostle Sanatorium. Cardinals and Bishops throughout the country are said to have almost unanimously endorsed the project as filling a long-felt need within the ranks of the clergy.

NEW YORK HOSPITAL-CORNELL MEDICAL COLLEGE ASSOCIATION'S CENTRE—Four new appointments have been made to the staff of the New York Hospital-Cornell Medical College Association's Centre, which will open in September, 1932, according to its director, Dr. G. Canby Robinson.

These appointments include Dr. Eugene L. Opie, as Professor of Pathology of the Medical College and pathologist to the hospital; Dr. Herbert S. Gasser, as Professor of Physiology; Dr. George S. Amsden, as Professor of Psychiatry and Psychiatrist-in-Chief of the hospital, and Dr. James M. Neill, as Professor of Bacteriology and Immunology.

Professor Opie succeeds Dr. James Ewing, who will retire as head of the department of pathology after thirty years of teaching in Cornell. He will devote his time to a study of cancer and the problems of the Memorial Hospital, of which he is president of the medical board.

Dr. Graham Lusk will retire from the Cornell faculty in 1932 after forty years of teaching. He will be succeeded by Dr. Gasser, now Professor of Pharmacology in the Medical School of Washington University, St. Louis.

Dr. Neill, who is Professor of Bacteriology at Vanderbilt University School of Medicine, succeeds Dr. William J. Elser, who will continue as head of the department of applied pathology and bacteriology.

Dr. Amsden will open the new department of psychiatry with Dr. William L. Russell.

NOTICE

DR. FRANK COLLOTEN announces the removal of his office to 20 Charlesgate West, Hotel Gralyn, Boston.

REPORT AND NOTICE OF MEETINGS

GRAND MEETING OF THE GERMAN GYNECOLOGICAL SOCIETY

From Our Foreign Correspondent

The annual grand meeting of the Deutsche Gesellschaft für Gynäkologie took place recently in Frankfort. On the evening previous to the opening a conversazione was held in the ancient archway building "Römerhallen." Next morning Professor

Seitz, the president of the meeting, solemnly opened the Congress in the ornamental hall of the Exhibition building. In the adjacent rooms the latest gynecological and obstetrical instruments and the most modern drugs and books were exhibited. Of the 860 members of the German Gynecological Society there were present at least 600, most of them with their wives and families, so that the procession of guests to the "Römerhallen" was a great sensation to the inhabitants of Frankfort. Besides Germans were Austrians, Dutch, Swiss, Danes, Norwegians, Swedes, Spaniards, Argentines, Americans, Letts, Jugoslavians, Czechs, etc., present. Hungary was represented by five professors, namely, Tauffer, Toth, Frigyessi, Scipiades, and Berecz. Professor Tauffer acknowledged his election as a "Member of Distinction" and at the same time proposed that following the next grand meeting, which is to take place in Berlin, 1933, the place of the meeting to be held in 1935, should be Budapest. His proposal was received with vigorous applause and was unanimously accepted.

The scientific work began with the elaborate paper of Professor Sellheim of Leipsic, who launched the theme of the first day's discussion: The lenient childbirth. The lectures following mainly dealt with the ways and means of rendering childbirth painless. Thurn-Rumbach exhibited a new apparatus for obtaining nitrous oxide analgesia; the apparatus was constructed in Budapest under the direction of Professor Frigyessi, director of the I. Gynecological Clinic. The final conclusion drawn by the lecturers and those discussing the matter was that it is a pity that for the time being we are not possessed of a method sufficiently reliable to render childbirth quicker and more painless, on the one hand, and entirely harmless to mother and infant on the other. The next theme for discussion was: Gestational Hormonal and Metabolic Changes. German and Austrian doctors reported on the gestation of diabetic patients coming to fortunate issue. On the second day Professor Fränkel, of Breslau, submitted for discussion, the theme which is so important from the medical as from the social point of view: The Problem of Sterilization and Contraception. Most of the lecturers and discussers threw light upon the theme from the points of view of the maintenance of the state and of the future and maintained the old, conservative principle which is against the justification of contraception. Nevertheless, energetic words were spoken also on behalf of the justification of contraception. Professor A. Mayer, of Tübingen, wanted to separate social from medical agenda entirely. Those who favored contraception accentuated the righteous interests and necessary being of the preventive actions, partly from biologic and eugenic points of view, and partly on the ground of social indication with regard to changed conditions and the miserable financial circumstances, and the general unemployment which follows suit. As to the technical side of the question all speakers unanimously objected to the use of the intrauterine pessaries and treatments and they as well discarded the hormonal sterilization which they deem a useless and inefficacious method.

Next day they dealt with the protection of mothers. They were of the opinion that the protection of mothers must be built up institutionally and on the whole they accentuated the necessity of the introduction and building up of the same organizations which are already introduced in some Western European countries. Afterwards they discussed some new operative methods. Professor Frigyessi made known a new and simplified method of anesthetizing the field of abdominal operations and Professor Toth read a paper on the advantages of the modifications of placenta previa operations initiated by himself.

On the fourth day the function of the anterior and posterior lobe of the hypophysis was discussed on the basis of the pertinent works of Aschheim and Zondek, whose names are familiar all over the world because of their gravidity tests. Several papers were read on the relation of the hypophysis to the uterus and ovaries respectively to the other internal secretion glands. In connection with this subject, reference was made to a new gravidity test: the Porges-Pollatschek test, which is based on the experience that the skin of gravid women is less sensitive against Prolan (ovarian hormon) than that of non-gravid women. Namely, injecting 0.2 c.c. prolan intracutaneously into the skin of a non-gravid woman produces a lively pink reaction, the size of a half dollar, which reaction is entirely absent in gravid women. The test has been subjected to extensive experiments in several European obstetrical clinics with the result that, on an average, the test is a failure in 30 per cent. of gravid, and in 45 per cent. of non-gravid women. Consequently the test is unsuitable for the diagnosis of pregnancy as well as for the sure exclusion of gravidity. On the last day the vomiting of pregnant women, the treatment of menorrhagia and metrorrhagia and toxicoses, and some actual questions on the pathology of childbirth were discussed. Professor Scipiades gave an account of the boric acid treatment of local puerperal diseases. Besides these physiological problems of general interest, the actual questions of radiotherapy, gynecological and urological topics were dealt with.

In addition to the exemplary reception the society, during the sessions, treated the ladies to sight-seeing tours around Frankfort and its environs.

THE AMERICAN PUBLIC HEALTH ASSOCIATION

The Sixtieth Annual Meeting of the American Public Health Association will be held in Montreal, Quebec, September 14-17. The Windsor Hotel will be headquarters.

It is hoped that the medical profession will interpret this announcement as an invitation to attend that convention.

C. C. Young, D.P.H., *Chairman.*

SOCIETY MEETINGS
CONGRESSES AND CONFERENCES

Aug. 31 - Sept. 4 — Neurologists will meet in Berne, Switzerland. See page 896, issue of April 23.

September 2, 3, 4 — American Academy of Physical Therapy. See page 215, issue of July 23.

September 11-12—New England Surgical Society. See page 366, issue of August 13.

September 14-17—The American Public Health Association. See page 415.

September 22, 23, 24—The Clinical Congress of the Connecticut State Medical Society. See notice on page 365.

October 5, 6, 7, 8—American Congress of Physical Therapy. See notice on page 272, issue of July 30.

October 12-16—An Announcement of the Clinical Congress of the American College of Surgeons. See page 1175, issue of May 28.

October 19-22—The Interstate Post Graduate Medical Association of North America. See page 1125, issue of May 21.

October 19-30—Graduate Fortnight of the New York Academy of Medicine. See page 1230, issue of June 4.

April 4-8, 1932—The American College of Physicians. See notice on page 1232, issue of June 4.

DISTRICT MEDICAL SOCIETIES

Bristol North District Medical Society

September 17—Details to be announced.

BOOK REVIEWS

Roentgen Interpretation. A Manual for Students and Practitioners. By GEORGE W. HOLMES, M.D., Roentgenologist to the Massachusetts General Hospital and Assistant Professor of Roentgenology, Harvard Medical School and HOWARD E. RUGGLES, M.D., Roentgenologist to the University of California Hospital and Clinical Professor of Roentgenology, University of California Medical School. Fourth edition, published 1931. Octavo, 339 pages with 237 engravings. Cloth, $5.00 net.

This work covers briefly and concisely the essential points of x-ray diagnosis. It is difficult to keep pace with the rapid advances which are being made in the field of roentgenology, but the fourth edition of this book has been thoroughly revised and is entirely up-to-date.

The chapters are as follows: Introduction; Confusing Shadows and Artefacts, Anatomical Variations and Development; Fractures and Dislocations; Bone Pathology; The Skull; The Spine; The Joints, Tendons and Bursae; The Chest; The Gastro-Intestinal Tract; The Genito-Urinary Tract; Fluoroscopic Technic. Considerable attention has been paid to developmental anomalies which are so often confusing not only to the beginner, but to those of wider experience.

The text in a work of this kind is of necessity condensed, but numerous references are given to the latest and best literature thus enabling one to look up any phase of the subject in greater detail. The illustrations have been well chosen, and the reproductions are unusually good. In many instances the roentgen findings have been substantiated by pathological examination.

This new edition should be welcomed by roentgenologists, and students of roentgenology.

Results of the Rabies Preventive Inoculation on Dogs in Japan. By SHINKICHI UMENO and SANAL UMENO. (From Kitasato Institute for Infectious Diseases.) The Kitasato Archives of Experimental Medicine, Vol. VIII, No. 2, May 1931.

Prophylactic inoculations of dogs with carbolized brain tissue were first made by Oshida in 1915, and Umeno in 1916.

The results of preventive inoculations in seven different Prefectures are given in detail, a final summary being given in the table reproduced below.

The Prefectures taken separately show a close correspondence between the reduction in the prevalence of rabies in dogs and the number of dogs inoculated. The years following the earthquake disaster in 1923 show a recrudescence of the disease in dogs owing to the omission of inoculation for several months. In four Prefectures there were no cases of rabies in the last year reported, 1929, and a total of only 16 cases as compared with several hundred to over one thousand in the earlier years.

As the table shows, rabies occurred in a considerable number of inoculated dogs, the rate, however, being only .033%. The rate for uninoculated dogs is not known, but is presumably enormously higher as we gather that the inoculations of known dogs were rather energetically pursued.

The study is comprehensive and would seem to be a convincing argument for inoculation as a method of controlling rabies in dogs. The summary table follows:

RESULTS OF THE RABIES PREVENTIVE INOCULATIONS OF DOGS IN SEVEN PREFECTURES

Year	No. dogs inoculated	Rabid dogs among Inoculated	Rabid dogs among Non-inoculated	Rabid dogs among Stray dogs	Total
1916	—	—	326	277	603
1917	823	—	394	248	642
1918	8,500	—	452	314	766
1919	33,999	15	253	294	562
1920	27,043	4	150	213	367
1921	46,216	17	266	242	525
1922	33,830	20	185	122	327
1923	35,215	9	116	92	217
1924	47,449	43	481	509	1,033
1925	95,458	49	757	574	1,380
1926	102,677	32	437	369	838
1927	99,169	24	217	165	406
1928	97,597	15	47	36	98
1929	69,981	3	7	6	16
Total	697,957	231	4,088	3,461	7,780

Transactions of the American Association of Genito-Urinary Surgeons, Vol. XXIII, 1930.

Last year's volume of the transactions covers a large variety of subjects devoted entirely to diseases of the genito-urinary tract. Excellent discussions follow each group of papers; discussions of unusual frankness and merit. Some of the subject

matter describes rarely encountered pathology of the urinary tract such as a case of unusual transverse division of the renal pelvis, actinomycosis of the kidney, and granuloma of the ureter. Other papers lead to broad discussions on renal tuberculosis, functional kidney tests, and prostatic surgery. An experimental study of the testicle by Moore brings out some facts of extraordinary interest, particularly in relation to the rôle of the scrotum in maintaining a lowered temperature for the testicle. It is shown that relatively minor changes in temperature in this organ may result in temporary cessation of function. Moore has demonstrated that the abdominally placed testis loses its spermatogenic function but regains it upon being replaced in the scrotum. The importance of this in undescended testicles is readily seen.

Clinical Dietetics. A Textbook for Physicians, Students and Dietitians. By HARRY GAUSS, M.S., M.D., F.A.C.P., Instructor in Medicine, University of Colorado, School of Medicine, assisted by E. V. GAUSS, B.A., formerly Assistant Dietitian, Presbyterian Hospital, Denver, Colorado. Illustrated. St. Louis. The C. V. Mosby Company. 490 pages. Price $8.

As stated in the preface, this book is based upon lectures to medical students, but probably with considerable expansion since the whole is a very comprehensive exposition of its subject. It is planned to meet the needs of three groups of persons: First, medical students and others who must study the theoretical considerations and exact calculations; second, hospital dietitians who wish detailed lists, ready to apply, for a week's menu of each diet; and, third, the patients themselves. To all of these it may be recommended as a safe book to consult and one from which much knowledge may be gained. It is clearly and pleasantly written, without descriptions which tax the understanding, and, wherever possible, historical and other sidelights are introduced which lend interest and broaden the perspective. As is probably necessary for completeness, many details are included which detract from the ease of consecutive reading. Nevertheless, those readers who are willing to apply themselves will be rewarded by an excellent view of the subject of dietetics.

The Surgical Clinics of North America. June, 1931. New York Number. Volume II, Number 3. W. B. Saunders Company, Philadelphia.

This issue is particularly noteworthy as a fracture symposium containing reports of the Clinical Meeting of the New York Fracture Committee of the American College of Surgeons conducted by Darrach and Murray. Darrach briefly discusses the open treatment of fractures. Royal Whitman explains the abduction treatment of fracture of the neck of the femur and Armitage Whitman adds further details in the use of the plaster-of-paris spica. Milliken's clinic is chiefly on fractures of the leg where he believes in individualized treatment, frequently using traction, sometimes with a nail through the os calcis. Compound fractures and fractured skulls, spines, patellae, and femurs are briefly discussed by various authors. Bartley used a hammock sling to secure a good result in traumatic separation of the symphysis pubis and sacro-iliac joints. He also ably outlines the appropriate treatment for the three types of fractures of the os calcis. Sneed presents five cases of varying types of acute infection of the hipjoint.

Lilienthal describes a very interesting case of diaphragmatic hernia of the liver in which the preoperative diagnosis was mediastinal tumor. After pinching the phrenic nerve the opening in the diaphragm was sutured without difficulty.

Stenbuck and Whitaker report their cases of empyema thoracis treated by gauze packing of the pleural cavity. After wide exposure of the cavity it is packed tightly with iodoform gauze which is removed in two days and sometimes repacked. They maintain that the pleural cavity is clean within twenty-four hours and remains so.

In general the clinics in this number are not so thoroughly discussed as in most issues.

The School of Medicine. By IRVING S. CUTTER, Sc.D., M.D. Ginn & Co. Boston and New York.

This brochure was published originally as Chapter X in "Higher Education in America", edited by Raymond A. Kent, President of the University of Louisville. It gives a comprehensive outline of the subject with numerous footnote references to other literature for further details, and concludes with ten statistical tables of information. It is presumably designed for the lay reader rather than for the professional medical educator, but it presents much information in condensed form and will prove a convenient handbook for the teacher also.

The style is straightforward and generally the meaning is clear, but lapses are to be noted. "As the standards of medical education increase", and "the curriculum has been definitely shortened" may be cited as examples. "Raising" and "increasing" standards are not quite identical, and the student who still has to spend four years of about eight months each in the medical school (in some schools a fifth year as interne is required before the degree is conferred) is not convinced of the "definite shortening" of the curriculum which is alleged. But anyone, who knows what has happened in the schools, knows what is meant.

Dr. Cutter's description of the "School of Medicine" is not meant to be exhaustive but there is one event to which reference should be made in any adequate description of what has happened in medical education in these past fifty years, without, of course, detracting from the importance of the points which are mentioned or the value of the movements which are described.

On page 287 Dr. Cutter says: "Several things happened about 1890 that influenced medical education and inaugurated an era of marked improvement. First was the publication of the Seventh Annual Report of the Illinois Board of Health; second, the campaign of publicity inaugurated by the American Medical Association through its *Journal;* third, the reorganization of the Association of American Medical Colleges. In 1903 the American Medical Association formed a Council on Medical Education." The unmentioned event was the opening of the Johns Hopkins Medical School in 1893, which was not a committee, nor a set of resolutions, nor a report, but an actual experiment, a practical demonstration, a going concern, with standards of medical education which, while undergoing some change, have not been surpassed, though they may have been equalled in this country in the nearly forty years since that time.

Dr. Cutter alludes to the proposal of the University of Michigan in 1890, as of "unusual interest". There is much to be read between the lines. There must have been considerable ferment preceding the drafting of the proposal, "for it reveals the fact that after nearly forty years of agitation the general plan of the curriculum of today is essentially that proposed by Michigan in 1890". The failure of the attempt to establish the curriculum proposed was of course not followed by the immediate disappearance of the ideas, and it is noteworthy that of the early faculty of Johns Hopkins Medical School, three members were from the University of Michigan and had been strongly infected by this ferment even if not actually causing it: Mall, one of the most penetrating critics of the medical education of his day; Abel, who is still discovering and teaching; and Howell, who, though he has recently retired from formal teaching, continues to devote himself to related lines of activity.

For the information of those interested in medical education in Massachusetts, Dr. Cutter notes that of six medical schools whose graduates are not admitted to examination for licensure in forty-six states, two are situated in Massachusetts, and of four such schools, the graduates are admitted to examination in no other state besides Massachusetts.

The book presents an adequate and satisfactory summary concerning medical education as it exists in the United States at the present time.

Noguchi. By GUSTAV ECKSTEIN. Harper & Bros., Publishers. New York and London. 1931. Price $5.00.

The author of this biography of Noguchi has been felicitous in the handling of his subject. He has produced a fascinating book in which are vividly portrayed, on the one hand, the man of science and his accomplishments, and, upon the other, the passionate, lonely, sensitive and intensely human personality which manifested naïve childishness in some of its reactions to life, but which linked this quality to the prodigious concentration and working power of the genius.

The permanent value of some of Noguchi's contributions to medicine cannot be appraised at the present time. For example, his findings in trachoma have not yet received general acceptance, and his views relating to Oroya fever and Verruga peruviana have not been confirmed by independent investigators.

Be that as it may, Noguchi, a Japanese of lowly origin, occupied for many years a foremost place in medical research and was known throughout the world. All honor to his memory for whole-souled devotion to his profession and for the courage that sweeps aside all obstacles!

Food Allergy. Its Manifestations, Diagnosis and Treatment with a General Discussion of Bronchial Asthma. By ALBERT H. ROWE, M.S., M.D. Published by Lea & Febiger, 1931. Price $5.00.

The conception of food allergy as a cause of many chronic ailments is new. A state of chronic hypersensitiveness to foods may well be more common than has been appreciated especially as the diagnosis need not depend upon the finding of positive skin tests. By stimulating interest in the condition, Dr. Rowe has done a real service. All students of allergy will read his book carefully and practitioners generally will find much of value in its pages.

The author is obviously an enthusiast. He writes well, presents an array of interesting case reports and fosters the impression that food allergy with its diagnosis and treatment by means of his elimination diets is all-important in medicine. In many places, a more careful critical analysis of the material would have made the discussion more convincing. For example, it is the elimination of wheat which is effective in many patients but what of the total carbohydrates? The problem is mentioned incidentally in the chapter on migraine, but it and similar questions need more prominence.

The literature is mentioned exhaustively in the text and in addition a "summary of literature" is given in the last chapter in which a miscellaneous assortment of references is arranged not by dates, nor by subjects, nor even alphabetically by authors' names and one wonders why it is included at all except that it is of some use to advanced students.

The bibliography is good but for some reason is arranged in two parts as though the problems of dust sensitiveness and bacterial sensitiveness were quite distinct from those of food sensitiveness.

The idea of this book is excellent and although the story could have been told with little repetition and in a much more concise and thoughtful manner the work deserves attention.

A Clinical Study of Addison's Disease. By LEONARD G. ROWNTREE, M.D., and ALBERT M. SNELL, M.D. Division of Medicine, The Mayo Clinic and The Mayo Foundation, Rochester, Minnesota. 12mo of 317 pages with 41 illustrations. Philadelphia and London: W. B. Saunders Company, 1931. Cloth, $4.00 net.

This interesting book contains an excellent clinical description of Addison's Disease and Adrenal Insufficiency. The clinical description as well as the laboratory data are well recorded and bring up to date our present knowledge. The authors are both courteous and wise in including a reprint of Addison's brilliant, original report. This model of clinical presentation with its modest handling of a classical description of a new disease should be read by all doctors. It also affords a striking contrast between excellent clinical discussions of diseases now and seventy-five years ago, and clearly shows how much more complicated medicine has become. The book also includes the various treatments for Addison's Disease with the early cases treated by the newly isolated active principle of the adrenal cortex. This active principle is of such recent discovery that final conclusions cannot be reached, but these early reports suggest brilliant therapeutic results. Like all early reports of new discoveries, there will have to be many revisions of the therapeutic uses of this new drug and its value, as suggested in this book, must certainly depend upon further clinical observations. It is highly probable that its use will be far more widespread than simply in this particular disease.

It would have been interesting had there been included in this book a fuller description of the known physiology of the adrenal bodies, but the authors have not stressed this part of our knowledge, limiting themselves to the clinical condition. In this field, however, the discussion is very well done.

Thomson and Miles' Manual of Surgery. By ALEXANDER MILES, M.D., LL.D., F.R.C.S. Ed. and D. P. D. WILKIE, M.D., F.R.C.S. Ed. and Eng. Volume first; General Surgery. Eighth Edition. 556 pages plus index, with 176 Illustrations. Humphrey Milford. Oxford University Press, London and Edinburgh. Price $3.80.

The frequent revision of this manual, since the first edition in 1904, testifies to its popularity as a teaching text in Great Britain. The authors express the hope "that the Manual faithfully presents the present-day position of Surgery, and reflects in particular the teaching of the Edinburgh School".

The volume under consideration, which deals principally with fundamentals, probably required only minor revisions, and certainly shows no evidence of provincialism, or of the particular teachings of the Edinburgh School. Chapters dealing with repair, inflammation, gangrene, infections, tumors, and trauma are fairly well standardized, and regrettably there are no marked new discoveries in these fields.

The last third of the volume begins the regional consideration of diseases, and covers surgical conditions of vessels, nerves, skin, muscles, bones, and joints. Brief paragraphs describe the disease process, its clinical features, pathological anatomy, and treatment. The space devoted to each subject precludes detailed consideration of anything but general aspects and principles. It is surprising, however, to find how much information has been compressed into this small volume.

The illustrations are unpretentious but excellent, and impress one again with the extensive clinical material and the advanced states of disease seen at European clinics. The size of the book is convenient, and the price brings it within reach of all medical students.

Studies from the Rockefeller Institute for Medical Research. Reprints. Volume 78. Published by The Rockefeller Institute for Medical Research. New York. 1931.

This volume of reprints contains an interesting discussion of the relationship between Hodgkin's disease and tuberculosis by Stewart and Doan. Further work on the phosphatide precipitin test in tuberculosis is reported by Doan and Moore. Rous continues his studies on the gradients of vascular permeability. Carrel's address "The New Cytology" is of much interest. In addition, the usual wide range of subjects from the various departments of the Institute are covered.

Chemistry for Nurses. By HARRY C. BIDDLE, A.M. F. A. Davis Company. Phila. 1931. Pp. 336. Price $2.75.

This book is based on the course in chemistry given to the nurses at the Lakeside Hospital. It combines in the single volume a brief discussion of the general features of chemistry and also a laboratory manual. The organization of the material is such as to facilitate review, both by the students and the instructors. Many of the experiments and the examples given in the text bear directly on the work of the nurse.

Cancer and Scientific Research. By BARBARA HOLMES, PH.D. The Sheldon Press. London. 1931. Pp. 158. Price $1.50.

This small, concise volume, written primarily for the laymen, will interest many physicians who have not had an opportunity to keep abreast of the more recent research work on cancer. All of the material presented is authentic and nevertheless is very readable. The chapter headings indicate the range of material treated: historical, statistical, occupational cancers, experimental cancer production, inheritance, transplantable and transmissible tumors, immunity, tissue culture. In addition, there is an appendix or glossary in which the technical terms are explained. This is one of the best non-technical books on cancer which has come to the attention of the reviewer.

The Rational Treatment of Varicose Veins and Varicocele. By W. TURNER WARWICK. Faber & Faber, Ltd. 5/- net.

This little book of one hundred and eighty-eight pages is extremely well written. There is much that is new, particularly regarding the etiology of these conditions. No author to date has set forth so clearly and conclusively the congenital background in varicosities as this one, the absence of adequate valves being stressed. Careful attention to the various types of cases as indicated by various tests and patent connecting veins will prevent the operator from expecting more than is reasonable from the injection treatment of varicosities.

The few pages devoted to hemorrhoids give a better idea of this situation in general, particularly from the standpoint of etiology and anatomy, than the reviewer has heretofore seen in print.

The method advocated by the author for the treatment of varicocele will probably not be generally accepted, nor are the operative results in this country on this condition as unsatisfactory as they appear to be in England.

Sixty Centuries of Health and Physick: The Progress of Ideas From Primitive Magic to Modern Medicine. By S. G. BLAXLAND STUBBS and E. W. BLIGH. New York: Paul B. Hoeber, Inc., 1931. xvi +253 pages. Price $5.00.

A notation occurred in the editorial columns of the *Journal* of June 4, 1931 on this interesting book by two English students of science, neither of them a physician. The book is an unusual one, dealing, as it does, with a history of the development of ideas rather than a series of biographies of well-known medical men. The illustrations, too, mark the book as outside the run of most publications on the history of medicine. It is a very readable account of the subject and can be highly recommended.

Practical Methods in the Diagnosis and Treatment of Venereal Diseases. By DAVID LEES, Surgeon in charge of Venereal Diseases, The Royal Infirmary, Edinburgh, etc. Second Edition, 634 pages. New York. William Wood and Co. 1931. Price $5.00.

This is the second edition of a small volume devoted to the diagnosis and treatment of venereal disease. The first edition was reviewed in December 1927. Certain new laboratory methods have been added to the new edition with additional chapters on cardiovascular and neurosyphilis. Except for these additions the new text is essentially the same as the old. It is a good book on venereal disease.

Discovering Ourselves. A View of the Human Mind and How it Works. By EDWARD H. STRECKER and KENNETH E. APPEL. The Macmillan Company, New York. 1931. Price $3.00.

"This book," the authors state, "is meant to be entirely practical. It is not written for psychologists or psychiatrists. It does not aim to discuss theoretical questions."

With this laudable purpose the authors have produced a glorified glossary of terms which are commonly used by the Freudian school—complex, ego, introversion, repression, sublimation, etc.

Perhaps they feel that by using circles, diagrams, and waving lines, they are substituting clarity for theory for the layman but this of itself is theoretical.

Until psychiatrists and psychologists are thinking more clearly and harmoniously, a non-theoretical primer of mental activity is a theoretical impossibility.

BOOKS RECEIVED FOR REVIEW

Injuries and Sport by C. B. Heald. Published by Oxford University Press. 543 Pages. Price $8.00.

Les Premiers Jours Du Nouveau—Ne by Marcel Metzger and Andre Heraux. Published by Gauthier-Villars et Cie. 444 Pages. Price 40 fr. (Broche)—45 fr. (Cartonne).

The Personality of Criminals by A. Warren Stearns. Published by The Beacon Press, Inc. 146 Pages. Price $2.00.

The Significance of Waterborne Typhoid Fever Outbreaks 1920-1930 by Abel Wolman and A. E. Gorman With a Foreword by Thomas Parran, Jr., published by The Williams & Wilkins Company. 82 Pages. Price $2.00.

Cunningham's Text-Book of Anatomy edited by Arthur Robinson. Sixth Edition. Published by Messrs. William Wood & Company. 1554 Pages. Price $11.00.

Headache by William H. Robey. Published by J. B. Lippincott Company. 234 Pages. Price $5.00.

Diagnosis in Joint Disease by Nathaniel Allison, and Ralph K. Ghormley. Published by William Wood and Company. 196 Pages. Price $9.00.

Bedside Interpretation of Laboratory Findings by Michael G. Wohl. Published by C. V. Mosby Co. 321 Pages. Price $6.00.

Cutaneous X-ray and Radium Therapy by Henry H. Hazen. Published by C. V. Mosby Co. 166 Pages. Price $3.00.

Modern Proctology by Marion C. Pruitt. Published by C. V. Mosby Co. 404 Pages. Price $8.00.

United Fruit Company, Medical Department. 19th Annual Report, 1930. 276 Pages.

Encephalitis Lethargica: Its Sequelae and Treatment by Constantin von Economo. Translated and Adapted by K. O. Newman. Published by Humphrey Milford, Oxford University Press. 200 Pages. Price $6.00.

The Causation of Chronic Gastro-Duodenal Ulcers —A New Theory by J.-Jacques Spira. Published by Humphrey Milford, Oxford University Press. 78 Pages. Price $2.50.